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USSR Report

MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No. 10, October 1983

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Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

CONTENTS

SQUADRON TACTICAL STRIKE EXERCISE DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 4-5

[Article, published under the heading "For a High Degree of Combat Readiness," by military pilot 1st class Maj V. Kuznetsov: "Tactical Air Exercise in the Squadron"]

[Text] The combat training schedule called for a squadron tactical air exercise, during which personnel would work on delivering bomb and missile strikes on ground targets deep in the "enemy's" defense in conditions of heavy air defense.

Exercises are always an important event in the life of aviation personnel. The results of past work are determined at exercises, the qualitative level of professional proficiency of personnel, the combat skill and tactical maturity of pilots are tested. Therefore each individual seeks to achieve maximum utilization of the time allocated for preparing for an exercise.

The flight personnel of our squadron are trained to fly in all conditions, day and night. The flights have attained good formation-flying precision and receive high marks in combat skills. Nevertheless the preparation period required a great deal of intense work: study of the ground situation, the specifications and performance characteristics of the aircraft and ground weapons of the opposing forces, plus many other items proceeding from the assigned task. Special attention was devoted to morale and psychological attitude toward mission operations by aircrews, engineer-technician personnel, and exercise area team. The schedule for preparing aviation personnel for the tactical air exercise was drawn up taking this into account.

The exercise area was familiar. Many had flown over it and had worked on the gunnery range. Although squadron headquarters did not yet have any precise information on the nature and location of the targets, aerial photographs of the terrain and large-scale maps enabled them to study the area of forthcoming operations with adequate completeness and accuracy. The terrain contained few reference-point landmarks. Undistinctive oxbow lakes, other lakes, swampy areas, large tracts of forest, where the "enemy" ground subunits could maneuver undetected not only made air reconnaissance difficult but also made it difficult for aircrews to orient themselves en route during low-level and nap-of-the-earth approaches.

I believe I am correct in stating that accomplishment of forthcoming missions begins precisely during the preparatory period. Tactical air exercise organizers and directors seek to make the situation during flight training activities as close as possible to actual combat. Subunit commanders, political workers, party and Komsomol activists endeavor to ensure that each and every air warrior prepares for an exercise without any compromise with realism, just as for a clash with a real adversary.

Everybody is clearly aware that prior to delivering a precise, sure strike on a target deep in the "enemy's" defense, it is necessary to penetrate his air defense. Thorough preparation is essential here as well, for the aggressive attitude, morale and psychological firmness of the aircrews are dependent primarily on confidence in their skill, their ability quickly to make an intelligent decision and to select the only correct tactical device, which is in conformity with the prevailing situation. Such qualities do not come automatically but are acquired in the course of persistent daily training.

At a certain training drill the instructor described the tactical environment: he designated a "battle line," an air defense zone, and described the nature of the target. Dividing aircrews into groups and designating group leaders, he instructed each group to come up with a solution for penetrating the air defense and reaching the target. This type of games method is like a unique competition. As practical experience indicates, it produces tangible benefit, for all aviation personnel take part in solving a problem, and they are given a broad opportunity for individual and group innovation. Every suggestion is discussed, and the commander makes the final decision.

Military pilot 1st class Capt A. Prishchepnyy suggested the most interesting version. Upon approaching the "battle line" the flight leaders execute a complicated maneuver close to the ground and at a predetermined speed, a maneuver which ensures air defense penetration. The pilots of Prishchepnyy's team displayed profound knowledge of fire capabilities and antiaircraft weapons as well as their performance characteristics. The aircraft formation in which the flight commander proposed to dispose his group, and subsequently evasive maneuvering in course and altitude to avoid antiaircraft fire would prevent the "enemy's" ground radars from locking onto and reliably tracking the targets. Airborne ECM gear would be aggressively utilized.

Deputy squadron commander Maj A. Chepel' devised a target approach variation and selected the most effective means of destroying the target. Taking into consideration (scenario-specified) weather conditions, time of day, and terrain configuration, he marked on the map a base reference point from which he figured the course to and time of arrival at the maneuver initiation point. The major proposed that they approach the target flying extremely low, with the sun at their backs. His plan specified a feint maneuver: after the first pair hit the target, a second pair of aircraft would approach the target from a different direction, as a feint. He specified return to base by the shortest route from the opposite direction.

The pilots suggested various problem solutions. They worked innovatively, and their schemes were distinguished by boldness. Characteristically, each sought

to incorporate his own favorite tactics and most polished maneuvers, inventively utilizing synthesized past experience of the unit's top combat pilots.

The proposals devised in the classrooms were subsequently carefully calculated phase by phase, and rehearsed by the "walk-through" method. The aircraft were positioned on the runway in various formations, and the pilots, consolidating skills in formation flying, practiced visually estimating lateral and forward spacings.

On flight operations days each group would practice techniques of conducting reconnaissance, seeking out specified targets, penetrating air defense, delivering bomber and missile strikes, and perfecting formation-flying skills.

Competition developed in the squadron between flights and aircrews in achieving best knowledge of the terrain, orientation and speed in finding the target, and excellent quality in performing flight training missions.

Squadron deputy commander for aviation engineer service Engr-Capt V. Zinchenko organized precision performance by the engineers and technicians servicing the aircraft. Socialist competition was also set up among groundcrew specialists. Competition was conducted primarily for exemplary aircraft preflighting. Excellent results were immediately synthesized and communicated to all personnel at daily performance evaluations and reflected in news bulletin leaflets and photonewspapers.

We should like specifically to discuss performance evaluation. The fact is that some subunit commanders consider it unnecessary to do this every day: it takes up a great deal of time, they claim, and in addition little performance materials are accumulated in such a short period of time. Everything depends, however, on how it is conducted. Of course lack of concreteness and imprecision of analysis and critique inevitably transform performance evaluation into a so-called exercise just for the sake of getting it over with. Personnel quickly become bored, and naturally no benefit is derived. Much here depends on the ability of commanders to analyze the principal results of the day's activities in a period of 10 to 15 minutes, to reveal the causes of failures, to explain them to the men, to note positive items meriting attention, and to assign specific tasks for the following day. As regards periods of preparation for a tactical air exercise, daily performance evaluations are particularly essential. They help not only improve the organizational aspect of things but also help strengthen the authority of commanders, get them accustomed to regular, systematic performance evaluation, precise planning and scheduling, and help them better study and grasp the professional and moral-political qualities of their men.

...The days passed swiftly, crammed with intensive combat training. During this time aviation personnel prepared well for the tactical air exercise. Nevertheless the call to regimental headquarters was somewhat unexpected.

All the deputy commanders and the executive officer had gathered in the regimental commander's office. The commanding officer called the officers over to a table, on which was spread a map indicating the exercise area. Even

a cursory glance sufficed to grasp the situation and the forthcoming exercise in a general way. Thorough study of the flight operations area "right down to the last little bush," as the pilots say, had an effect. After attentively listening to the exercise briefing, however, the officers realized that a great deal still remained to be done in order successfully to accomplish the task.

The timetable was extremely tight. Effective results were achieved by efficient utilization of each and every hour of training time at the first stage of preparation for the tactical air exercise. Now they knew the specific exercise area and the tactical situation. Proceeding from this, they held a class to study the air defense weapons the "adversary" might have at his disposal, the nature of the targets and indications giving them away, and they devised tactical variations.

The signal to assemble announced commencement of the tactical air exercise. Following a preliminary briefing, aircrews proceeded to execute the exercise scenario.

Aircraft took off in pairs, at reduced time intervals. Reconnaissance data indicated that in the target area the "enemy" was deploying mobile missile systems beyond the "battle line" and intended to strike a concentration of ground subunits which were preparing to launch an attack. The pilots' mission was to knock out the launchers before they fired their missiles.

The first pair of aircraft was l e d by military pilot 1st class Capt A. Smirnov. They were to perform final reconnaissance and pinpoint the target. The performance of these pilots would determine in large measure the success of the subsequent aircraft pairs, led by military pilots 1st class Majs A. Chepel' and A. Ryakhov and Capt A. Prishchepnyy.

At the designated time Captain Smirnov's voice came over the radio: "Ready ordnance for release!"

This command was to the wingman and meant that the target had been spotted.

Executing a vertical maneuver, the aircraft pair headed swiftly toward one of the "enemy" missile launchers. Smirnov's voice again came over the radio: "This is 101, targets 1 kilometer north of reference point. Marker center of target, cloud cover seven tenths, cloud bases 500."

The second pair was now approaching the bombing range. As had been rehearsed during preparation for the exercise, upon penetrating the air defense zone the pair approached the target from a different direction and delivered an accurate bomb strike. Mission accomplished.

In the course of the tactical air exercise the aircrews performed all missions with excellence. This was promoted by thorough preparations on the ground, properly organized party-political work, professional expertise, firm military discipline and organization on the part of the men.

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IMPORTANCE OF OBEYING LAWS, REGULATIONS STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 6-7

[Article, published under the heading "Implementing the Decisions of the 26th CPSU Congress," by Candidate of Juridical Sciences Col Just V. Gushchin, deputy judge advocate general: "V. I. Lenin and the CPSU on Socialist Rule of Law"]

> [Text] "A normal course of our societal development is inconceivable without the strictest observance of laws which protect the interests of society and the rights of citizens."
>
> From speech by CPSU Central Committee General Secretary Comrade Yu. V. Andropov at the CPSU Central Committee Plenum on 15 June 1983

Immediately following the victorious Great October Socialist Revolution, a Legislative Proposals Commission was formed at the initiative of V. I. Lenin, and a "Sobraniye Uzakoneniy, Rasporyazheniy i Aktov Sovetskogo Pravitel'stva" [Compiled Legislative Enactments, Ordinances and Prescriptions of the Soviet Government] was published.

In November 1918 the 6th All-Russian Extraordinary Congress of Soviets adopted an enactment on revolutionary rule of law. It emphasized that precise observance of Soviet laws is essential for further development and consolidation of worker and peasant rule. The congress called upon all citizens of the Republic, including Red Armymen and Red Navymen, as well as all governmental agencies strictly to observe the laws of the RSFSR, decrees and ordinances issued by the central authorities.

When the Civil War came to an end, the party was faced with new and important tasks in the area of development of law. These tasks were discussed by Vladimir Il'ich in his address at the 9th All-Russian Congress of Soviets in December 1921. In particular, he defined socialist rule of law as the existence of a system of legislative enactments in force and their unconditional observance by all governmental agencies, public organizations, officials, and citizens. V. I. Lenin stated that it is essential "to consider not only the letter but also the spirit of our Communist legislation and to prevent even the slightest departure from our laws...."

Vladimir Il'ich was particularly intolerant of violations of socialist rule of law by officials. He demanded prosecution and severe punishment of those who ignored the laws, who abused their office, who were guilty of red tape, bureaucratic delay and punctiliousness, he demanded strict condemnation and punishment of persons guilty of a callous attitude toward the needs of the toilers, of violations of state discipline, and he demanded that such things be extensively publicized by the press and by means of public court actions in order to mobilize the public resolutely to combat such phenomena. His telegram to V. A. Avanesov, D. I. Kurskiy and A. D. Tsyurupa is confirmation of this: "There is no doubt that we have persons guilty of bureaucratic delay and punctiliousness, and principle requires that public judicial action be taken against such persons... not so much for the sake of severe punishment (perhaps a reprimand will be sufficient) but for the sake of publicity and to change the general conviction that the guilty parties are safe from punishment."

V. I. Lenin formulated an important thesis in his letter entitled "On Dual Subordination and Rule of Law": in our country there should not be a Kaluga rule of law in distinction to Kazan rule of law. There should be a uniform legal order for all Soviet republics. It is essential to establish a uniform interpretation and application of laws throughout the entire territory of the Soviet State.

Of great significance in this connection is Lenin's statement that placing rule of law and expediency in contrast and opposition to one another cannot be permitted. Vladimir Il'ich held that socialist rule of law is at the same time the highest level of expediency and appropriateness, which signifies full conformity between Soviet laws and the aims and tasks of building socialism. In his opinion, the question not of whether a given provision of the law should be applied but rather of how better to implement the law should be resolved in the process of employment of the law.

Leninist principles of socialist rule of law formed the basis of subsequent activities by the CPSU and Soviet State pertaining to building socialism and communism. They are formally embodied in the USSR Constitution. Adoption of the requirements of socialist rule of law in all domains of the affairs of Soviet society is formally stated in decisions of the CPSU and the Soviet Government.

The Program of the Communist Party of the Soviet Union states, for example, that violations of socialist rule of law are incompatible with Leninist standards of party affairs. The party states the task of ensuring strict observance of socialist rule of law, of rooting out all violations of the law, of eliminating crime and all its causes. For the first time in the history of our state the question of the total elimination of crime has thus been articulated as a vital, practical task which must be accomplished in the period of transition from socialism to communism. The campaign against bearers of bourgeois ethics and morality and against persons who violate socialist law and order is being greatly intensified toward this end. The decisions of the 26th CPSU Congress and the party Central Committee decree entitled "On Improving Efforts to Safeguard Law and Order and to Step Up the Campaign Against Law Violations" formulate a specific program to strengthen socialist rule of law, discipline, and organization.

This Program was further developed in the documents of the November (1982) and June (1983) CPSU Central Committee Plenums. Addressing these plenums, CPSU Central Committee General Secretary Comrade Yu. V. Andropov pointed to the necessity of waging a more resolute campaign against violations of party, state and labor discipline and of increasing the activeness of the toiler masses.

As V. I. Lenin noted, a campaign against all departures from rule of law will be successful only when the masses themselves take part in this campaign. Nor is it a coincidence that the USSR law on workforces and enhancement of their role in management of enterprises and organizations states that workforces shall take measures to indoctrinate their members in a spirit of observance of Soviet laws and respect for the rules of socialist intercourse, an uncompromising position toward drunkenness, hooliganism, moneygrubbing, and other opposites of Communist ethics and morality and take part in efforts to prevent law violations.

At the same time, as was stressed at the 26th CPSU Congress, a high degree of responsibility for strengthening socialist rule of law and legal order is born by the legal system, the courts, the public prosecutor's office, and by the Soviet militia. It is for good reason that the 12 January 1983 Decree of the Presidium of the USSR Supreme Soviet states that public prosecutors at all levels must take measures to ensure fuller utilization of powers granted by the USSR Constitution and laws to exercise oversight to ensure precise and uniform execution of the laws, in spite of any local or ministerial influences, and must take measures to uncover and promptly to correct any law violations.

This demand applies in full measure to command personnel endowed with investigatory authority in the Armed Forces, as well as other officers who may be assigned to perform investigatory functions or administrative inquiry.

V. I. Lenin and the Communist Party always attached paramount importance to matters pertaining to strengthening socialist rule of law, establishing discipline and legal order in the Soviet Armed Forces. Vladimir Il'ich viewed socialist rule of law as a means of strengthening military collectives, of increasing their fighting efficiency and combat readiness, as one of the most important conditions for victory over the enemies of Soviet rule. In view of the inseparable link between rule of law and military discipline, he demanded: "Obey all laws pertaining to the Red Army, carry out all orders, and make every effort to maintain discipline in the Red Army not out of fear but by conscience...."

The CPSU Central Committee decree entitled "On Measures to Improve Party-Political Work in the Soviet Army and Navy," dated 21 January 1967, as well as other party documents stress that in present-day conditions, when the Army, Air Forces and Navy are armed with potent nuclear missile weapons and combat hardware, the role and significance of discipline become even greater. This demands of each and every defender of the homeland the most precise and to-the-letter observance of the military oath, military regulations and orders by superiors, flawless efficiency and organization, since the slightest manifestation of complacency and lack of discipline can lead to serious consequences.

Precisely this is demanded by our country's Constitution, which states that each citizen of the USSR must obey Soviet laws, respect the rules of socialist intercourse, act in relentless opposition to antisocial actions, and bear with honor and dignity the lofty title of Soviet citizen. Also in keeping with this demand is Article 3 of the Disciplinary Regulations of the USSR Armed Forces.

A detailed discussion on further strengthening of military discipline and socialist rule of law as an integral component part of a high degree of combat readiness was conducted at the Sixth Armed Forces Conference of Secretaries of Primary Party Organizations. It was noted in particular that party organizations are called upon to ensure that each and every Communist, regardless of the position he holds, possesses thorough knowledge of and unswervingly observes Soviet laws and military regulations. We, stated USSR Minister of Defense MSU D. F. Ustinov, member of the CPSU Central Committee Politburo, must ensure that the experiential posture of each and every serviceman is defined by the conviction that regulations and orders constitute law, which must be obeyed by everybody without exception, absolutely and unswervingly. The present international situation demands an even higher level of army and navy combat readiness, the components of which include firm military discipline and rule of law.

Air Forces units and subunits have amassed considerable experience in strengthening rule of law and military discipline and in ensuring firm observance of regulations. In the military units commanded by officers A. Milyayev and A. Goguadze, for example, for a long time now there have been no near-accident incidents, and aviation personnel have been achieving excellent results in combat and political training. Success is determined in large measure by efficient ideological-political indoctrination and organizational work by commanders and political workers, party and Komsomol organizations. Combined measures are also being carried out in the area of legal indoctrination of military personnel and preventing law violations. There has been created in these aviation units an atmosphere of strong demandingness, implacability toward various carelessness and negligence, and all deviations from the provisions of military regulations, orders and instructions, for accident-free flight operations should totally exclude irresponsibility, complacency, a negligent attitude toward observance of existing rules and regulations, and disregard of the technical capabilities and performance characteristics of combat fixed-wing and rotary-wing aircraft.

Special importance for strengthening socialist rule of law and legal order in leading aviation units and subunits is attached to ensuring personal exemplariness on the part of command personnel in unswerving observance of legal prescriptions and the demands of Disciplinary Regulations, which require that they constantly offer their subordinates an example of obeying Soviet laws and flawless execution of the demands of the military oath.

As is indicated by prosecution and investigation experience, the main causes and conditions underlying air mishaps include violations of orders, regulations and directives governing the obligations of assigned personnel regarding organization for and conduct of flight operations, guarding the life and health

of aviation personnel, performance of duty, and proper care of military property. As a rule violations occur where ideological indoctrination and legal awareness work are poorly done, where concern about the needs of servicemen is not combined with continuous monitoring of their activities and a high degree of demandingness, while appeals calling for strict observance of laws, regulations and orders are not backed up by deeds. Such deficiencies have been discovered, for example, in the subunit in which officers V. Dolmatov and N. Yermakov serve. Their careless indifference has been the reason for damage to expensive aircraft equipment.

Unfortunately some commanders issue orders and instructions which are at variance with the demands of laws and military regulations and violate the specified procedures of handling letters, requests, and complaints of military personnel and members of their families. Frequently this is connected with poor knowledge and understanding of current laws, and sometimes simply involves personal lack of discipline. There is no other explanation, for example, for the following: in the course of a year's time subunit commander officer V. Kolmakov received four letters from parents of men under his command and failed to reply to a single one.

Effectiveness of indoctrinating aviation personnel in a spirit of observance of socialist rule of law depends in large measure on a combined approach to solving this problem and skilled utilization of the entire arsenal of forms and methods of governmental, ideological-political and societal influence in the campaign against law violators. It is the duty of commanders, political workers, party and Komsomol organizations -- while implementing the behests of V. I. Lenin and the instructions of the party -- not simply to record shortcomings or engage in seeking justifications for violations which have occurred, but constantly to wage a determined campaign against all deviations from standards of socialist ethics and morality and violations of Soviet laws and the requirements of regulations of the USSR Armed Forces.

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IMPORTANCE OF COUNTERING U.S. PSYWAR ACTIVITIES STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 8-9

[Article, published under the heading "At the Fronts of the Ideological Struggle," by Docent and Candidate of Historical Sciences Col G. Mishurovskiy: "The Poisoned Weapons of Lies and Slander"]

[Text] The course of historical events of the contemporary era attests to the fact that the world of socialism is expanding and is inevitably supplanting capitalism. This is an objective law of societal development. At the same time, in present-conditions the process of forward development of progressive forces is taking place in an intense struggle against militant imperialist forces. This is also expressed in the domain of ideology.

As is emphasized in the documents of the 26th CPSU Congress and the proceedings of the June (1983) CPSU Central Committee Plenum, determining influence is being exerted on the ideological contest in the contemporary world by continuous change in the correlation of class forces in favor of socialism. An important cause of the increasing severity of counterattacks by imperialism is the fear by reactionary forces of further growth of the world Communist, worker and national liberation movement. Increasing aggressiveness of the ideological struggle and "psychological warfare" by reactionary forces are also connected with aggravation of the ideological-political crisis of contemporary capitalism. At the present time anticommunism and anti-Sovietism are the principal directional thrusts in bourgeois ideology.

The CPSU Central Committee decree entitled "On the 80th Anniversary of the Second Congress of the Russian Social-Democratic Workers' Party" stresses that U.S. imperialism and reactionary circles within the NATO bloc have proclaimed a new "crusade" against the USSR and the nations of the socialist community. Today's American "crusaders," who have proceeded with practical waging of "psychological warfare," operate with sophisticated and insidious methods. In October 1982, for example, they held a so-called conference on problems of democratization in the socialist countries. This signaled the beginning of a large-scale campaign of ideological sabotage and furnished an impetus for intensifying coordination of subversive actions by antisocialist forces. Conference participants included experts from the CIA and representatives of the U.S. propaganda services, who in the past organized counterrevolutionary

conspiracies in Hungary, Czechoslovakia, and subsequently in Poland as well.

This was followed by another conference, devoted to the problem of "free elections." The participants in this conference fervently discussed, devised plans, and talked over the matter of how to export and impose a hostile ideology in the socialist countries, how to set up and support a "legal opposition" in those countries.

Recently another anticommunist assemblage was held in Washington. Its American organizers saw as its main objective the favorable molding of public opinion, slandering the Soviet Union and its peace-seeking foreign policy, aggressively pushing the myth of a nonexistent "Soviet military threat," and demanding that the USSR accept the U.S. "zero option" at the Geneva talks.

At the beginning of 1983 the U.S. Government announced a so-called 20-year program of democracy and public diplomacy. It was devised with the active participation of the CIA and the National Security Council and is directed primarily against the nations of Eastern Europe, Latin America, East Asia, and Africa. Washington intends to spend 65 million dollars on implementation of this program in fiscal year 1984. This program in fact constitutes cynical, camouflaged interference in the affairs of sovereign nations. It constitutes a number of acts of ideological sabotage against freedom-loving peoples and calls for giving financial assistance to pro-American political parties and bribery of mass media, trade union, religious and other organizations "which can be useful to the United States." It specifies a series of measures aimed at strengthening reactionary, pro-American regimes, expanding the printing of lying publications which ballyhoo a "prosperous America," and at creating a "fifth column" of imperialism in developing countries. For all practical purposes this program is one more graphic confirmation of the fact that U.S. imperialism is openly seeking to intensify the ideological contest with the world of socialism and with peoples which are fighting for their independence and freedom.

In their "psychological warfare" against the USSR and genuine socialism, in recent years U.S. ruling circles have pursued a policy of curtailing financial-credit and trade relations and so-called economic exhaustion of the socialist countries by stepping up the arms race. The present administration in Washington, for example, blinded by anti-Sovietism, attempted to place an embargo on delivery of equipment to the USSR for construction of the Urengoy-Pomary-Uzhgorod natural gas pipeline. And this attempt was a failure, for the Soviet Union is a mighty industrial power, capable of providing for its own requirements in various equipment.

In the ideological contest between the two systems, bourgeois propaganda makes a considerable effort to distort the social nature, character, purpose and functions of the armies of the socialist countries, and particularly the USSR Armed Forces. It subjects the Warsaw Pact Organization to fierce attacks.

"Psychological warfare" pertaining to problems of war and peace is assuming the most antihumane, deceitful forms in the anti-Soviet strategy of the present

U.S. Administration. A constant attempt by the United States deliberately to discredit the peace initiatives of the Soviet Union, attacks on the policy of détente and the endeavor to frustrate it are nothing other than ideological support of the arms race and military preparations by the Pentagon and its NATO allies. The U.S. Government is making an intensive effort to propagate the myth of a "Soviet military threat" and is ascribing to the USSR a tendency toward aggression and an attempt to dictate to the peoples of Europe, Africa, and Central America in its own interests. The Washington Administration needs these fanciful lies in order to justify the global militarist plans in which the United States itself is engaged.

On 9 March 1983 the Pentagon announced publication of the second edition of the pamphlet "Soviet Military Power," with a foreword by U.S. Secretary of Defense C. Weinberger. Just as the first edition, it contains considerable juggling and manipulation of facts and unsubstantiated allegations of "U.S. military fallbehind." It states, for example, that the U.S. Air Force presently contains not 574 B-52 strategic bombers as stated in the annex to the SALT II Treaty, but only 241. That is, the number has been understated by more than 300. And yet it is a well-known fact that the United States has not engaged in any mass retirement of these aircraft. In addition, in this second edition of the Pentagon lie, Soviet strategic aviation includes aircraft called "Backfire" in the West, aircraft which on the basis of their performance characteristics, as was noted in the SALT II Treaty, cannot be considered strategic bombers. Certain facts and figures in the pamphlet which reflect the actual state of affairs in the balance of power and which confirm an approximate military parity between the USSR and the United States are drowned in an enormous quantity of deliberately false data.

At the same time the Reagan Administration is continuing to step up military preparations. This is attested in particular by a directive issued at the beginning of March of this year by the U.S. secretary of defense on directions to be taken in organizational development of U.S. armed forces. Main emphasis is placed on achieving superiority over the Soviet Union in nuclear arms. The directive focuses considerable attention on building space weapons. It is planned to deliver to the armed forces by 1987 at least 15 F-15 aircraft armed with antisatellite missiles. The U.S. Air Force plans to form five new tactical fighter wings by 1988 (72 aircraft each), increasing the total number of wings to 42. Pentagon military expenditures will increase from 322.4 billion dollars in 1985 to 464 billion in 1989.

These are the realities; this is the truth of the matter.

The anticommunist notion of "Communist terrorism" is a no less deceitful weapon in the arsenal of "psychological warfare." The Soviet Union and the other socialist countries are accused of giving material and moral support to countries within the zone of the national liberation movement, the struggle of which for national and social liberation is considered by imperialist circles to be "international terrorism." The purpose of this claim is to distort the aims of the countries of genuine socialism, to discredit their firm policy in the struggle against international terrorism practiced by the imperialist powers, to disunite the countries of socialism and the developing country to the greatest possible extent, and to worsen relations between them.

Practical realities and numerous facts attest, however, that terrorism is the product and creature of reactionaries. Even in present-day conditions extremely reactionary U.S. elements and regimes supported by them are perpetrating terrorist actions against peoples which advocate freedom and independence. Actions by counterrevolutionary bands against Afghanistan, for example, bandit raids by Israel onto the territories of Arab countries, aggression by the South African racist regime against Angola and Mozambique, and occupation of Namibia constitute international terrorism. The United States is using international terrorism in the struggle against socialist Cuba and its leader, Fidel Castro, and against the peoples of El Salvador and Nicaragua. According to reports in the U.S. magazine ATLANTIC, 19 million dollars have been allocated for subversive operations aimed at overthrowing the legitimate government of Nicaragua, and millions have been appropriated for the clandestine war against the Angolan, Afghan, and other peoples.

We should particularly stress that vast manpower and resources in the United States and the NATO countries have been mobilized and thrown into the "psychological war" against the USSR and the other socialist countries. Imperialism has established a great many Soviet studies centers, the task of which is to give the appearance of scholarly inquiry to slanderous lies. There are more than 150 of these in the United States alone. A total of approximately 400 propaganda centers and organizations of imperialist states are operating against the USSR.

The intrigues of imperialism, however, its ideological aggression and "psychological warfare" against the USSR, which has been raised to an unprecedented height, inevitably founder and break up against the friendship of peoples, patriotism and internationalism, the unity of the Soviet people, their solidarity behind the CPSU, their readiness and willingness to defend at all times their homeland and the socialist community. "We shall continue in the future doing everything necessary to guarantee the security of our country, our friends and allies, and we shall increase the combat power of the Soviet Armed Forces -- a mighty factor in restraining the aggressive aspirations of imperialist reaction," stated CPSU Central Committee General Secretary Comrade Yu. V. Andropov in his address at the June (1983) CPSU Central Committee Plenum.

In conditions of an appreciable aggravation of the ideological contest between two opposing systems -- socialism and capitalism -- the Communist Party attaches paramount importance to instilling a high degree of political vigilance in working people and Soviet servicemen as a most important condition of continuous combat readiness on the part of the Soviet Armed Forces. A major role in this important business is played by commanders, political workers, engineers, all categories of officer personnel, party and Komsomol organizations of units and subunits.

In a complex international situation, where the forces of imperialism are attempting to push peoples onto a path of enmity and military confrontation, the party and state are firmly defending the vital interests of our homeland and are maintaining a high degree of vigilance, readiness and willingness devastatingly to repulse any attempt at aggression.

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INDOCTRINATION DURING ALERT DUTY URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) p 10

[Article, published under the heading "For a High Degree of Combat Readiness," by military pilot 1st class Gds Capt M. Popov: "Ordered to Commence Alert Duty"]

[Text] The aviation personnel stood at attention. The commanding officer was reading aloud the order to commence standing alert duty. The solemn music of the USSR National Anthem was playing. The faces of my colleagues -- Gds Capt Vasiliy Shershnev, Gds Capt Tech Serv Lev Khristich, Gds Pfc Sergey Ushlachev, Gds Pvts Vasiliy Chuchmayev, Renat Khusniyarov, and others -- were serious. We were being entrusted with the mission of protecting the peaceful skies of the homeland. Everybody feels an enormous sense of responsibility at such a time. The most unexpected, most complex air situation will not hinder the sentinels of the skies from executing an operation order. A guarantee of this is firm Communist conviction, a high degree of professional expertise, solid moral-psychological conditioning, and excellent physical training.

A party meeting was recently held in the subunit, at which aviation personnel preparation for standing alert duty was discussed. It is true that there were no grounds for concern. The men always perform their duties in an excellent fashion. But this is a tradition in our unit: the standing of alert duty is discussed at every meeting. On this occasion as well party members raised the question of the quality of preparation for alert duty shifts and meeting of socialist pledges by personnel.

Those who spoke at the meeting noted that mistakes sometimes occur in servicing equipment by some ground maintenance specialists who have recently been authorized to stand alert duty (although they possess a high level of proficiency). It was therefore decided to hold additional training classes and drills with the younger personnel. Experienced specialists were assigned a patron status to the newcomers. It is the veterans' job to teach the newcomers everything they will need to know in a combat situation.

All party members supported the activist initiative. The mentors who were assigned this important task helped the young aviation personnel in all areas.

They taught them and shared their own experience and know-how in servicing aircraft. Additional drills were held in the subunit to work on meeting combat performance standards, as well as talks on vigilance, the demands of the military oath, and V. I. Lenin's behests to Soviet servicemen.

Our relief detail commenced alert duty. We had the honor of standing alert duty during the final performance testing. Each man was fully aware of the responsibility we bore. During these moments one feels particularly strongly the proximity of the border.

The silence in the ready room was broken by a command from the command post: "120 ready to scramble."

Men and equipment were at a high degree of alert readiness. If the need arises, it is essential to scramble an aircraft swiftly to meet a threat. The success of a sortie depends in large measure on this. If you lose even a few seconds, the enemy may get through to the defended installation unpunished....

Aircraft ground technician Gds Capt Tech Serv L. Khristich and his ground crewmen were already gathered at the combat aircraft. Soon the voice of the tactical control officer came over the speaker. Gds Capt A. Petrulis briefly described the air situation. The aircraft ground technician was standing on a ladder rung above me, bending over. He was carefully adjusting the parachute harness, checking that the toggle switches were switched on, and was carefully inspecting the instruments. Everything was in order. Exceptional precision and follow-through are demanded of each and every individual standing alert duty. Lack of discipline and carelessness even in so-called trivial matters will inevitably lead to an irrevocable loss of time, and perhaps to mission failure as well.

The beginning and end of a combat alert duty shift demand particular attention and precision. By the end of an alert duty shift people are getting tired and their actions are not as precise as during the first hours. Some mechanics, feeling that their job is already completed, relax excessively. And if they include an undisciplined individual, alert readiness will surely suffer. The person responsible for the alert duty shift must bear this in mind.

I recall an occasion when we went on alert duty. The men were working indefatigably, as they say. But the radio benchman seemed to lack desire. It was necessary right on the spot to give him a strict reminder of his personal responsibility for guarding Soviet airspace.

Some officers believe that military discipline should be strengthened other than when standing alert duty and that this should be done not by the pilots but by those who designate duty personnel, that is, their immediate superiors. The argument is that these are the ones who select the personnel, and they are the ones who should be answerable. Of course nobody demands that a pilot, for example, present lectures and reports at night. But indoctrination of follow-through and absolute obedience is a continuous process, and a pilot on alert duty plays a principal role in this process. One should not feel shy about once again reminding a person of his obligations. It is a bad

thing when alert duty personnel are left on their own. Just as in any other activity, unrelenting oversight, high demandingness, and intolerance toward unnecessary relaxation of demands and laxity are necessary during alert duty.

Aircraft technician Gds Sr Lt Tech Serv Aleksandr Novitskiy, radar equipment benchman Gds Pvt Vasiliy Shvardak, and aircraft equipment mechanic Gds Pvt Zeynidin Davudov vigilantly do their part in guarding the airspace of the homeland. These are highly-skilled specialists; they always maintain aircraft equipment in exemplary condition. And never have the aviation personnel deviated from the demands of regulations and manuals.

Our alert duty came to an end. We were relieved by a new team of sentinels of our country's airspace.

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KOMSOMOL ACTIVIST PERFORMANCE EFFECTIVENESS CRITIQUED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 11-12

[Article, published under the heading "Implementing the Decisions of the 19th Komsomol Congress," by Capt N. Chebotarev: "The Ability to Fire Hearts"]

[Text] The Komsomol organizers and secretaries of the subunit Komsomol committees listened attentively to officer V. Senchenko's speech at the meeting of unit Komsomol activists. Senchenko spoke without haste and convincingly about how he and other members of the aviation squadron Komsomol committee were forming in each flight and servicing group Komsomol organization a businesslike, innovative atmosphere, and how much energy they were expending on seeking new, more effective work forms with the aim of increasing the militance and aggressiveness of Komsomol members and mobilizing them for complete and high-quality fulfillment of socialist pledges. In short, the activist's speech was profound and pithy at first glance.

A week went by, and then another. Busy training days, with day and night flight operations, preliminary and preflight preparation pushed out of one's immediate thought impressions about the meeting of Komsomol activists. New activities and concerns were drawing aviation personnel into the fast-moving round of daily activities.

What about officer Senchenko? It seemed that every working day was filled to the limit for this squadron Komsomol activist. Following morning formation he would meet and talk with comrades about service activities and plans for the future. Later, if he was free from duties, he would work at the library. He would take newspaper and magazine files and leisurely make notes in his notebook. He would also carefully copy down from orders and other documents information on the number of Komsomol members who were rated excellent in combat and political training, socialist competition leaders, category-rated specialists, would make concise notes on work accomplished, such as "spoke with squadron Komsomol activists," "checked the state of the Komsomol display stand in the Lenin Room," "analyzed gross violations of military discipline," etc. Only after this would he proceed with his regular duties, and without excessively troubling himself or exceeding specified work hours. As for the airfield, where Komsomol members labored in fair weather and foul, and where was born that very lively, innovative atmosphere in the units about which he

spoke so much at activist meetings, Senchenko did not feel particularly drawn toward it.

It once happened that several kilometers from the snug apartment of the Komsomol leader, where he, free from the toil of servicing flight operations, was enrapturedly reading an adventure novel, work was in full swing at the airfield, quivering from the roar of jet engines and pierced by a cold wind. Junior aviation specialist Pvt N. Vinogradov spotted a problem on the aircraft being serviced by Komsomol member Pvt S. Gur'yanov. Under the supervision of officers, both were selflessly working on correcting the malfunction and preventing the possible occurrence of an air mishap. These aviation personnel were being offered warm words by all personnel. Gur'yanov, taking to heart the kind words of his older comrades, firmly resolved to make the military his career -- to enroll in aviation engineering school. The commanding officer rewarded Vinogradov with a short home leave, citing the mechanic's intelligent actions as an example for all the men. Other aviation personnel also distinguished themselves during that flight operations shift.

But all these events took place without the involvement or knowledge of Komsomol activist Senchenko, and he is basically of the opinion that nothing important took place at the airfield. In his opinion nobody had performed a heroic deed worthy of attention. The fact is that Senchenko had lost the trust of the Komsomol members and had ceased to be their leader.

Here is another example. On the eve of a tactical air exercise which was to be an important test of combat readiness, Komsomol activist Sr Lt G. Chernyshov spent all day on the flight line with pilots, ground maintenance technicians and mechanics, had analyzed together with the Komsomol committee members the level of technical preparedness of the young aviation personnel and their capability successfully to accomplish forthcoming tasks at the tactical air exercise, and visited the barracks in the evening. The following day Chernyshov submitted proposals at a meeting of the Komsomol committee: a suggestion to prepare for and hold a competition for the best man in an MOS, to organize a "Komsomol searchlight" inspection to check the state of equipment assigned to Komsomol members, and to receive reports by Komsomol member officers at a committee meeting on indoctrination work with subordinates.

After this, work was literally in full swing. The Komsomol committee members became inspired with their leader's ideas, worked out competition rules, held an inspection campaign, and received Komsomol member reports. In addition, in each group they discussed their tasks at the forthcoming tactical air exercise. And everywhere the Komsomol members were backed up by their mentors, party members.

As a result the squadron successfully accomplished all missions assigned at the tactical air exercise. As the commanding officer noted, considerable credit for this goes to the subunit's Komsomol units, led by Sr Lt G. Chernyshov.

Here is an example from the life of another Komsomol organization, where Lt V. Akimov is a member of the Komsomol committee. At a committee meeting they discussed the contribution of Komsomol members toward implementation of the

Food Program. Many suggestions were made. But Lieutenant Akimov made the most sensible one. The young officer suggested that during off-duty hours they renovate a greenhouse in order to be able to produce more vegetables for the officers' and enlisted men's mess. This initiative was supported by the command and by party activists. Bricks, cement, lumber, glass, and other necessary materials were made available. Lieutenant Akimov worked long and hard. A good job on the project was done by Komsomol members A. Matveyev, V. Gyuko, V. Molodtsov, and others. The job was completed quickly. Some time later the Komsomol people invited leader-Communists to the mess hall to taste the vegetable shop's products.

Komsomol activist Lt V. Akimov is highly respected. Aviation personnel frequently come to him with urgent problems which are troubling them. They know that he will give them help and sensible advice.

Pondering these facts, one cannot help but ask oneself: what must be done in order to fire people's enthusiasm with personal example? Is any unusual talent needed for this? Indeed, talent is necessary. It is called organizing ability. But this is not enough. One needs desire and the ability to work with others, enthusiasm for civic-minded volunteer work, and a feeling of responsibility for the assigned task.

Some Komsomol activists have the ability to be eloquent public speakers. And at first glance their words are quite persuasive. But subsequently it suddenly becomes clear that their words are at variance with their deeds. The result is fine-sounding words, with little done to carry out slated plans. As a rule, with such activists all work boils down to preparing report documents and calculating various figures. And they call this lively, innovative work with personnel. Officer Senchenko, about whom we spoke at the beginning of the article, is precisely such an activist. It is highly regrettable that one is apt to encounter in military units others such as him.

...Young aviation personnel gathered in the squadron Lenin Room one Sunday. Officer V. Dudko was strumming a guitar, and someone was telling a funny story. They sang a jolly song, which boosted their spirits. It was a happy evening. It seemed that everything was right with this Komsomol organization. But when one looked more closely at the work performance of Komsomol activist officer Dudko, the picture of his activities proved to be quite different. Komsomol meetings and Komsomol committee sessions were boring, and report documentation was being neglected. Increasingly frequent instances of violation of military discipline were not receiving proper response.

Practical experience convincingly shows that if an activist is guided by the decisions of the 19th Komsomol Congress, by the demands of the 26th CPSU Congress, and by CPSU Central Committee decrees, things go well for him. To work in Komsomol is not only a great honor but also a great responsibility. This was emphasized at the Komsomol congress. And indeed, the ability, efficiency, conscientiousness, initiative, excellent moral qualities, and human charm of Komsomol workers and activists determine in great measure the militance and lively, innovative atmosphere in the Komsomol collective. This is a demand of the times, a demand of our Leninist party.

In connection with this we should like to stress more one thought. The effectiveness of work with young people by Komsomol activists and their ability to fire the hearts of aviation personnel, to lead them, also depend in large measure on how methodologically correctly activists are taught to work with others by commanders, political workers, and party organizations. No matter how effective forms of teaching and instructing Komsomol activists may be, the best school for each of these is practical work with aviation personnel. It is precisely in the companies and squadrons, at the airfield and in the classroom, where personnel are accomplishing combat training tasks, that Komsomol leaders, working under the guidance of experienced leader-Communists, learn in a practical manner the complex art of influencing others. Party guidance of Komsomol is accomplished most fully precisely in this area.

Where the personal example of party members and probationary members, their advice and warnings against mistakes and errors form the basis of daily indoctrinational work with Komsomol activists, as a rule there are no "big talkers," and therefore there is no place for passivity, sluggishness, and complacency.

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COMPETITION IMPORTANT IN BOOSTING COMBAT PROFICIENCY

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[Article, published under the heading "Effectiveness and Efficiency to Competition," by Capt O. Podryadchikov: "'We Shall Catch Up With the Leader....'"]

[Text] Squadron commander Lt Col Ye. Karlov walked into the classroom in which the pilots had gathered shortly before the end of the flight operations shift.

"Well, let's total up the results," the squadron commander addressed the pilots. "All officers accomplished the assigned task. The best competition results were achieved by Sapronenko's flight. Panfutov's flight finished a bit further back, and chiefly due to certain errors committed. This is why Captain Sapronenko's men continue to be the competition leaders."

Analyzing in detail exercise performance by each pilot, the squadron commander concentrated principal attention on deficiencies and their causes and pointed out how more effectively to prepare for flight operations. The clear-cut conclusions presented by Lt Col Ye. Karlov helped the pilots better grasp what they had achieved and where they must still work to improve. This gave a fresh impetus to competition among the flights.

One can scarcely exaggerate the mobilizing force of socialist competition. This is a truly powerful means which makes it possible to strengthen discipline, organization, and boost combat readiness to a new high. The results of the most recent training period offer evidence of this. The men of the squadron under the command of officer Ye. Karlov met their pledges with excellent quality and took first place in the regiment. The aviation personnel are endeavoring to maintain the squadron's ranking of excellent. But the collective is faced with difficult missions. The present international situation, which has become sharply aggravated through the fault of the present U.S. Administration, which has adopted a policy of escalating the arms race, is placing new demands on aviation personnel combat readiness. These officers, who are flying third-generation aircraft, are successfully accomplishing many difficult tasks.

Before the squadron's pilots commenced mastering a new aircraft, the commanding officers, his deputies, and party activists took counsel with one another on

how to accelerate the training process. Maj V. Vkladov, squadron deputy commander for political affairs, suggested organizing competition between subunits with a differing level of combat training. As a result of such competition the less proficient aviation personnel would gain the desire to catch up with and surpass the leaders, who in turn would not want to yield the leadership position they had earned. The squadron commander and the other officers supported this proposal.

A discussion was held at a squadron party meeting on how to increase the effectiveness of competition and to give training a competitive character. The pilots of Capt L. Sapronenko's flight challenged to competition the pilots of Capt Ye. Panfutov's flight. Sapronenko is an experienced combat pilot, with a mastery of teaching skills and methodological expertise. It is not surprising that his men are advancing swiftly and confidently through the training program.

The situation is different in Panfutov's flight. A double load was placed on the flight commander's shoulders: he himself was working on mastering the new equipment and was at the same time teaching his pilots.

It might seem that the flights' abilities are too unequal. The level of proficiency of the competing personnel, however, gradually equalized. Captain Panfutov adopted all the best elements from the methods employed by Captain Sapronenko: methods of verifying execution of pledges, forms and techniques of organization of theoretical and flight training.

Once, on the eve of a flight operations shift, Capt N. Lych asked Sapronenko to show how to execute a complex air combat maneuver. The flight commander drew the flight trajectory on the board. Several pilots from the neighboring flight came up to the officers. Captain Sapronenko explained in detail how much speed should be maintained and where, how to keep one's position in formation, how to distribute one's attention, how to work with sight and weapons, and at what range to fire missiles.

On the following day many of the pilots who went up accomplished the exercise with high marks. They included officers from Captain Panfutov's flight. They equalled their rivals in most indices. Sapronenko congratulated his colleague on his success and said jokingly: "Are you trying to catch up with us? Do you have enough thrust?"

"Sure have, Leonid Aleksandrovich," replied Panfutov. "We shall also win the victor's pennant with your help...."

"Go for it. We shall be as pleased as you."

Panfutov understood full well that it would not be easy to win out in competition with such a powerful competitor. Nevertheless his intention to bring his flight up among the leaders was quite serious, for Sapronenko's subunit also took time to become the best. The pilots of this flight were once scheduled to perform a combat maneuvering drill. They prepared thoroughly for it. Sapronenko briefed his men on the procedure and sequence of actions in the practice area and went through the drill.

The flight took to the air. The pilots formed up and proceeded to maneuver in formation. Sapronenko executed a left turn, followed by a right turn. He glanced back. His wingmen were scattered as by the wind. The formation had broken up.

After landing back at the field, the pilots assembled in a classroom.

"We have nothing to be pleased about today," the flight commander stated. "Do you know the reason for the errors? Not inadequate knowledge of skills, but rather mutual distrust. Instead of watching your flight leader, you kept an eye on each other. You operated your controls too heavily and abruptly. We have not yet achieved precision in formation flying. But it begins here, on the ground."

Preparing for the next flight operations shift, the flight commander "walked through" the flight drill with his men. During this ground drill the pilots frankly stated their doubts, asked questions and, when necessary, asked their flight commander to repeat something if they did not understand it. They performed with greater confidence when the flight took to the air again.

Captain Sapronenko was endeavoring to establish in the collective comradely mutual assistance, support, and cohesiveness. Within a short period of time he succeeded in strengthening discipline, achieving total mutual understanding, and instilled in his men the endeavor to achieve optimal performance results in combat training. Now the pilots of Sapronenko's flight perform all assigned tasks with high marks.

At first Panfutov's men also experienced certain difficulties. Yevgeniy Aleksandrovich had only recently taken over command of the flight. The pilots differed in their level of flight training proficiency, which naturally placed an imprint on mastery of the training program. Batuyev and Rytikov, for example, had to fly with precision in formation as a 2-aircraft element. The fact is that Rytikov was somewhat behind his comrades in flying technique.

Captain Panfutov realized from the very outset how important it is to deepen one's knowledge of theory and to improve one's professional expertise and methodological proficiency. He had a good example. And the young flight commander worked persistently to adopt the advanced know-how of his competition rival. He set to work with redoubled energy. As they say, he kept his nose in the books day and night. He jotted down Sapronenko's advice and recommendations in his notebook. He increased his demandingness on his men and appraised attained results with frankness and in a party-minded way. He devoted particular attention to preparing the pilots psychologically.

Once when he was totaling up competition results for the month, the squadron commander pointed to mistakes made by his subordinates in performing flight training assignments. Once again the flight commander turned to the experience and know-how of the leaders. One of the pilots in Sapronenko's flight had been making similar mistakes. The flight commander then analyzed the causes hindering the officer from successfully performing flight training tasks and helped correct them.

Now Panfutov had a like task. It was necessary to help Capt S. Rytikov. The flight commander endeavored to make the practice drills as close as possible to actual flight conditions and instructed the pilot to handle complicated scenario instructions on his own. Gradually things started to improve. Captain Rytikov was making appreciable training headway.

The tactical air exercise presented a serious test for the squadron aviators. They were to fight mock air engagements, penetrate a deeply-echeloned "enemy" air defense, and hit air targets at various altitudes. The squadron commander was placing great hopes on Captain Sapronenko's flight. On the very first sortie the pilots demonstrated excellent flying skill and weapon proficiency, setting the tone in the competition.

Soon the fighters of Captain Panfutov's flight took to the air. The target coordinates were communicated from the ground. It was maneuvering, attempting to evade pursuit. The flight leader executed a hard turn and initiated an attack pass. Ordnance delivery was on target. This was confirmed by film.

Each pilot flew several sorties during the exercise. They performed boldly, resolutely, with initiative. Sapronenko's flight executed the assigned mission with an average mark of 4.2, while Panfutov's flight earned a mark of 4.

The training year is coming to an end. The commander will determine upon totaling up results which flight will be the competition winner. But one thing is quite clear: pilot combat proficiency and squadron combat readiness are the winners.

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IMPORTANCE OF EXAMPLE SETTING BY COMMAND PERSONNEL

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[Article, published under the heading "Military Educational Institution Affairs," by instructor and military pilot 1st class Maj I. Sukhov: "Example of the Commander"]

[Text] "Work persistently to improve methodological and professional training; constantly enrich yourself with new knowledge of military education science and psychology." This is one of the points in the socialist pledges of our squadron's pilots. It is directly connected with improving pilots' skill and their ability to teach young people who have dedicated their lives to aviation, to fly, and to understand the finer points of their future profession. But how is it being carried out in practice?

Summarizing the results of the past period of training, squadron commander Maj V. Shilin analyzed in detail achievement of pledges, indicated deficiencies in combat training, and specified ways to strengthen discipline and observance of regulations. The commander commended leading-performance officers Majs I. Bakhal, Yu. Barantsov, V. Bakhayev, and Sr Lt A. Chechulin.

The squadron's aviators are successfully accomplishing the tasks assigned to the collective. They are confidently striding toward the designated goal: to complete the training year with excellent results and to maintain the subunit's rating of excellent. Major Shilin inspires the men to new achievements through personal example. In organizing competition he skillfully applies the Leninist principles of publicity, comparability of results, and opportunity to emulate advanced know-how. The men are successfully meeting their pledges. They are emulating their commander, who is instilling in his men confidence in their own ability and is infusing them with energy.

Personal example of the commander. The meaning of this broad and multifaceted concept is: offer an example in all things. In our collective Vladimir Ivanovich Shilin is known as precisely such a commander. Wherein lies his strength? Primarily in the fact that his words are not at variance with his deeds. He firmly guides his subunit, ensures unswerving execution of his decisions, socialist pledges, has a good understanding of military education science, and is sensitive toward others.

Shilin began displaying organizer and pedagogic abilities early in his instructor career. Delving into all the details of training and indoctrinating future pilots, he worked persistently to understand the methodology of professional training. He sequentially went through all the stages of professional growth from pilot-instructor to squadron commander. Responsibility for a large collective rests on his shoulders. But Major Shilin does not shirk difficulties. He relies in his work on his deputies and party activists. His subordinates are distinguished by cohesiveness and industry and are familiar with the end goal toward which they must strive.

Taking command of the squadron, the first thing Major Shilin did was to give some thought to how to boost to new heights the effectiveness of competition and the subunit's combat readiness. At a party meeting the squadron commander shared his thoughts and ideas with party members. In particular, he instructed the flight commanders to direct the efforts of their men toward achieving stable end results in training and called upon them to inspire the men through personal example in competition to achieve successful fulfillment of socialist pledges. The commander particularly emphasized that practical realities demand of officer-leaders the ability to work with others, to unify men into a cohesive organism, to ensure a high degree of organization and discipline, and to accomplish assigned tasks in an exemplary manner.

The squadron's Communists unanimously supported their commanding officer and resolved to become the leader in competition with the other subunits. Toward this end they organized an exchange of pilot-instructor work know-how in teaching and indoctrinating pilot cadets. The commanding officer himself shared a great deal.

Most of the school's graduates remember Major Shilin with gratitude. Today's pilot cadets as well consider their commanding officer to be a sensitive, demanding, and fair-minded mentor.

...After training on the L-29 trainer, pilot cadet V. Mal'gin was to learn to fly a more complex aircraft. Major Shilin examined his service record. His efficiency report stated that Mal'gin was slow in mastering theoretical material and had difficulty acquiring flying skills. Vladimir Ivanovich set for himself the task of determining and correcting those problems which could hinder the pilot cadet from successfully progressing in the flight training program.

When dual flight training commenced, the student pilot performed with composure, but he was slow in making the necessary decisions and in responding to a situation change. It also seemed to his instructor that he was indifferent toward improving his professional qualities.

A delayed reaction is a serious shortcoming for a pilot, which can lead to unpleasant consequences. On one training flight Mal'gin failed fully to complete the scheduled drill.

"Is there something wrong?" his instructor asked during the post-flight critique. "Are you under the weather?"

The student pilot replied in a somewhat apathetic manner: "I forgot about the chandelle...."

Vladimir Ivanovich felt a sense of indignation, but he restrained himself: he knew that it was useless to reproach this officer candidate, and particularly to give him a dressing down. His character and personality were such that it would have no effect.

He needed to find an approach to Mal'gin, to compel him to work at full effort. But how? The officer turned to his education science and psychology textbooks and analyzed experience amassed in the regiment in working with lagging pilot cadets. And he decided to try to place Mal'gin into conditions which would not permit him to let down in effort.

Major Shilin became more demanding on the officer candidate and worked purposefully on developing in him persistence, discipline, and initiative. At first no changes were noted in Mal'gin's behavior. The instructor's efforts seemed to be in vain. But Shilin did not hasten to draw any conclusions. Once when checking readiness, the instructor noted some gaps in the student pilot's knowledge and temporarily grounded him, designating a time by which he was to correct his deficiencies.

We must state that such instances are rare in the squadron. At first Mal'gin may have felt uncomfortable in the collective, gazing enviously at his comrades as they returned from the airfield. And he set about seriously to work.

"Now we shall test your proficiency on the simulator," Shilin told the officer candidate. "If you are not sure of yourself, we can put off the dual."

Concern flashed in Mal'gin's eyes: "I am ready."

He took his place in the simulator cockpit, and the instructor sat at the control console.

"Run through it," Shilin ordered.

A 360 degree banked turn left, then right.

"Not bad. Continue."

Mal'gin executed dives, steep climbs, and chandelles. But he did make some mistakes. After the simulator session the officer summarized his performance.

"You must fly more cleanly, operating the controls and throttle more smoothly. You do not quite correctly distribute your attention when executing maneuvers, and therefore you deviate from the specified conditions. Generally speaking, you did a satisfactory job."

"May I do some more, comrade major?" Mal'gin asked.

"Fine, take your place in the simulator."

This time the student pilot made far fewer mistakes.

"If only you would perform with equal smoothness in the air," the instructor sighed. "But you will again forget something...."

"Don't worry, comrade major. I won't let you down again."

On the day scheduled for dual instruction Vladimir Ivanovich was probably as nervous as his student. But the pilot cadet successfully performed the flight training assignment.

We should stress that Shilin employs various methodological teaching devices and methods. For example, in order to increase Mal'gin's active innovativeness, he drew him into competition with a student pilot who was doing better in flight training. Mal'gin endeavored not to lag behind his comrade, while Vladimir Ivanovich continuously supported his aspiration to surpass his competition rival. When Mal'gin achieved appreciable success, the officer counseled party and Komsomol activists to tell about him in the wall newspaper. This literally buoyed and inspired the officer candidate! Thanks to his instructor's efforts, in time he achieved stable performance results in flight training.

Major Shilin works painstakingly and thoughtfully not only with future pilots. Many squadron officers turn to him for advice and recommendations. The commander always supports his men. Take the following, for example.

Several years back a graduate of this same school, Lt A. Chechulin, was assigned to the squadron as an instructor. He was a good pilot, and he possessed teaching ability. Major Shilin drew up a plan and schedule for breaking in the young officer and counseled him to adopt socialist pledges. Very soon Chechulin had amassed the required experience. The development of this young pilot-instructor seemed to be progressing well. But soon the lieutenant displayed an appreciable loss of enthusiasm and inspiration.

It was necessary to have a frank talk with him: it was learned that the young officer was worried about his family, which was still residing in another town. His concern affected his job performance.

"Have patience for a bit," said Lieutenant Shilin. "We'll take care of the matter of housing."

This was difficult. Although intensive construction was in progress at the base, housing was still in short supply. Major Shilin succeeded in convincing his superiors of the need to assign an apartment to Lieutenant Chechulin. This officer's mood improved, and he began working with redoubled energy. Under his guidance the student pilots are advancing smoothly through the flight training program. Sr Lt A. Chechulin has now reached the proficiency level of pilot-instructor 2nd class, is working hard to improve his job proficiency and methods skills, and he is successfully meeting his socialist pledges.

Unquestionably the more demanding a commander is on himself and his subordinates, the more effective is his personal example. And it is very important not only to indoctrinate and to teach, but also to have paternal concern for others. Many of the squadron's pilots have felt the commander's salutary influence. There has developed in the subunit a stronger atmosphere of trust, mutual support, high-mindedness, and innovative enthusiasm. This is one of the reasons why people's aggressive activeness in competition for excellent performance results in combat training is steadily increasing.

Take flight safety, for example. The pilot-instructors themselves unswervingly observe the rules and regulations of flight operations and demand the same of their student pilots. The squadron commander provides a fine example. I recall the following incident.

...That day Vladimir Ivanovich was to flight-test an aircraft following routine maintenance in the technical maintenance unit. As always, the pilot had prepared well for the assignment. He read through the appropriate procedure instructions and studied the requisite documents.

Upon receiving tower clearance, he taxied to the active and took off. Clearing the overcast, he entered the practice area and reported to the tower. While executing maneuvers, he noted that the artificial horizon was giving false readings. He established straight and level flight, and reported the occurrence to the tower. He made his approach and landing on his backup instruments. This was not a difficult predicament for an experienced pilot. But when the regimental commander cited Major Shilin's actions as an example to the men, this played a strong indoctrinational role.

Vladimir Ivanovich teaches student pilots the ability to assess the situation quickly and intelligently and demands that they follow the rules and regulations of flight operations.

Once the commanding officer was taking a check flight with pilot cadet V. Lugov. The young pilot failed to follow proper procedure on the approach glidepath, and the aircraft began losing altitude rapidly. Shilin immediately took over the controls.

After landing, he grounded the student pilot, and then proceeded to determine the reason for what had happened. Comparing facts, he concluded that upon approaching the ground the student had fixed his gaze, although the proper procedure was to run it glancingly across the ground surface. Checking the student pilot's knowledge of theory, the commander proceeded to have him drill on distributing his attention on the landing approach. He taught him where he should look and how, and he advised him to look at objects around him, even when he was on the ground, in such a manner as not to fix his gaze on them. Ultimately the student pilot corrected his errors and learned to distribute his attention correctly.

Competition among young pilots for excellent quality of training flights is very important during the period of flight training. During this time student flight training is very intensive. And one must pay very close attention and be ready for any unexpected occurrences. The squadron commander, party and

Komsomol activists watch closely to ensure that the young pilots precisely meet their pledges. Materials on the "Competition Screen" display stand are renewed daily. The experience of the top performers is promptly adopted in a practical manner. Reports by pilot-instructors on improving professional expertise and methods skills are regularly presented at meetings of the subunit party bureau. Competitiveness helps intensify the training process and helps make it more effective. It has become a regular practice in the squadron to discuss each potential competition winner with the squadron commander, his deputies, the flight commanders, and the technical maintenance unit chiefs. The opinion of party and Komsomol activists is always taken into account. Such an approach eliminates the possibility of subjective conclusions and evaluations.

Squadron personnel are preparing to total up combat training performance results. Socialist pledges have mostly been met. The pilots' skill has risen to a higher level.

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WELL COORDINATED GROUND CREW TRAINING PROCEDURES OUTLINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 27-28

[Article, published under the heading "Into Competition," by Maj V. Usol'tsev: "Airfield Dawns"]

[Text] Dawn was just breaking when the ground maintenance specialists arrived at the airfield. The sky was graying in the east, snuffing out the stars one by one; a line of demarcation between light and dark was becoming increasingly more defined. A rosy glow appeared in the east; a crimson dawn was surging outward.

The ground crews were to preflight the helicopters before the aircrews arrived.

Having briefed his men on the mission at hand, Maj Tech Serv V. Chirkov, squadron deputy commander for aviation engineer service, glancing over the assembled personnel, added the customary question: "Any questions?"

"No sir," officer S. Alipov replied for the men. "We shall have the helicopters ready to go on schedule and do the job right."

The flight line came to life. Technicians and mechanics removed covers from the helicopters and unbuttoned numerous access covers and cowlings. Inspecting his men's work, party member Chirkov was pleased with their precise, confident actions. The proud thought came to him that he had been instrumental in helping the ground crewmen hone their skills. Vladimir Ivanovich had complete trust in each and every one of them. He was well familiar with the individual characteristics and abilities of the ground maintenance specialists and the level of their proficiency. They had on numerous occasions greeted the coming of dawn at the airfield!

One cannot state that the squadron aviation engineer service which V. Chirkov had taken over was in bad shape. But the new supervisor did encounter certain difficulties right at the outset. Certain of the technicians and mechanics were committing violations of discipline. Some were not putting a full effort into performing their duties. He did not immediately find a way to reach the hearts of his men. He used kindness on some, severity on others, and influenced others by means of trust and confidence. He endeavored to understand

and help each individual. And he was successful. Now the team of technicians and mechanics is commended every time they total up performance results.

At the time Chirkov was given the new job assignment, many experienced ground crew specialists had been discharged into the reserves or had transferred out. Their places were taken by new graduates of aviation technical schools and novice enlisted personnel. Of course it became more difficult to ensure flight operations safety, high quality and promptness of performance of servicing and maintenance on aircraft equipment.

Vladimir Ivanovich focused principal attention on improving quality of training. He himself conducted training classes on the most difficult topics, thoroughly preparing for each class, and he sought to ensure that there were no gaps in his men's knowledge. He demanded the same attitude toward technical training on the part of the others.

Officer Chirkov valued each and every minute of on-duty time. How were things in the past? Aircrews would take off on a training mission, and the ground technicians and mechanics, putting their tools away, would put the flight line in order and head for the smoking area. Thus valuable hours would be lost. Vladimir Ivanovich arranged things differently. Giving instructions to unbutton access covers and cowlings on a parked helicopter and gathering together ground crew personnel not engaged in other work, he would begin going through with them in more detail a given piece of equipment or system. He would draw their attention to typical malfunctions and effective techniques of spotting and correcting them.

At first his comrades were surprised: how did Chirkov get to know the helicopter so well? He had previously been working with swing-wing fighters. But they soon realized that Vladimir Ivanovich worked hard, frequently referred to the helicopter technical description and, spending time on flight lines where experienced flight technicians were working, he did not consider it beneath his dignity to learn from them better methods of helicopter servicing and maintenance or to heed their advice.

Of course Major Technical Service Chirkov was not the only one holding training classes for the men. He enlisted experts: officers V. Pankratov and V. Bukhbinder, Warrant Officers V. Platonov and M. Sinyutin, as well as others among the squadron's top specialists. The know-how of the right-flankers was regularly synthesized in the subunit, and competitions were held for the title "Best in Occupational Category."

All this enabled the young aviation personnel rapidly to gain thorough knowledge of the helicopter and quickly acquire the requisite skills. Quality of equipment servicing and maintenance improved. The men began striving to surpass specified performance standards.

The deputy commander for aviation engineer service decided to speed up the process of checking instruments and equipment. He assembled the group chiefs and said: "Let's put our heads together and determine how to improve the quality of our work."

Vladimir Ivanovich knew that frequently delays occurred due to inefficient equipping of work stations. But he said nothing: instilling practical initiative in the men is one of the specific features of his work style. And the group chiefs themselves stated the reason for time losses.

"Well, if the reason is known, we must correct it," summarized Chirkov. "Get together with your men and give some thought to how we can better reequip the laboratories, what must be done for this. Report back your suggestions one week hence."

At the designated time they discussed the plans of forthcoming work operations. They drew up a work schedule, a list of requisite materials, and designated responsible individuals. Officer Chirkov endeavored to provide his men with everything they needed and kept an eye on what was being done and how it was being done. The aviation personnel realized that his demands were fair and worked at full effort.

Competition for best laboratory layout developed among the groups. A large contribution to the common cause was made by master WO V. Yefremov, specialists 1st class Sr Lts Tech Serv M. Yerokhin and I. Gormilin, Warrant Officers G. Shlyapnikov, V. Chekurov, V. Fadeyev, and others. Each had contributed several efficiency innovation proposals. The aircraft equipment servicing group headed by Engr-Lt M. Prokhorov was the winner.

Reoutfitting of the laboratories was one more step toward additional successes. Training-production facilities continued to be improved. Officer Chirkov and his men clearly understand that it is very important to seek new, improved methods of working on aircraft equipment.

Vladimir Ivanovich Chirkov has the highest proficiency rating -- master. He is quite willing to share his wealth of experience and knowledge with his colleagues. Now all officers and warrant officers in the squadron are proficiency-rated 1st class or master. After the first year of service junior aircraft maintenance specialists become specialists 2nd class and 1st class after a year and a half. More than 60% of the technicians and mechanics are excellent-rated in combat and political training.

The subunit deputy commander for aviation engineer service devotes particular attention to the recent graduates of aviation technical schools and warrant officer schools. One of the specialists is assigned to look after each of them. Such assistance, combined with commander demandingness, has enabled Engr-Lts M. Prokhorov and V. Bruyev, WO A. Shchelkanov and others to become rapidly broken into their jobs.

For a long time now the squadron has had no near-accident situations or instances of failure to accomplish flight training missions through the fault of maintenance personnel. And a great deal of the credit for this goes to leader-Communist V. Chirkov. The men are working hard to meet socialist pledges and are endeavoring to complete the training year in a worthy manner. Maj Tech Serv Chirkov, deputy commander for aviation engineer service of an excellent-rated subunit, serves as an example for them.

This flight operations shift was no exception. The officer in command skillfully guided the actions of his men. The result of the harmonious, coordinated labor of the ground crewmen is excellent preparation of equipment for performing all scheduled missions.

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POTENTIALLY DANGEROUS AIRCREW ERRORS ANALYZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 29-30

[Article, published under the heading "Constant Attention to Flight Safety," by military navigator 1st class Col A. Yudenko: "Two Dangerous Situations on One Flight"]

[Text] While on a cross-country training flight in formation, the aircrew of Maj A. Zadorozhnyy, whose navigator was Capt P. Afanas'yev, made several mistakes. This led to the occurrence of difficult situations in the air and failure to complete the mission.

I happened to be involved in the postmission critique. Although a fair amount of time has passed since that time, the salient points are still fresh in my memory. In addition, we still have the flight recorder data indicating the actions of officer Zadorozhnyy's crew at all stages of performance of the assigned mission. I believe that an analysis of the flight recorder data would be instructive today as well.

I shall cite excerpts from the taped intercom communications between members of Major Zadorozhnyy's crew (call sign 155), their communications with the tower, as well as queries by the commander of the aircraft proceeding behind them (call sign 157) at the stages of the flight where mistakes were made.

During execution of maneuver for commencing cross-country formation flight.

05:02:45. (Major Zadorozhnyy's crew) Navigator: "Commander, 30 seconds to turn." Commander: "Roger, advise as we approach."

05:03:00. Navigator: "15 seconds to turn."

05:03:13. Navigator: "Initiate right turn."

05:03:17. Commander: "155, turn."

05:04:00. Navigator: "Commence climb."

05:05:00. 157: "155, why are you turning left?"

05:05:15. (Major Zadorozhnyy's crew) Navigator: "Commander, I said right turn." Commander: "Roger, right turn."

05:05:35. Tower: "Why are you turning left?"

En route.

08:18:30. (Major Zadorozhnyy's crew) Navigator: "18 minutes 30 seconds. Crossing waypoint. Turn to heading 045." Commander: "Heading 045."

08:22:30. Navigator: "Drift angle plus five. Heading 040." Commander: "042."

08:25:50. Commander: "Navigator, present heading 033." Navigator: "Why 033? Turn to 045." Commander: "Turning to 045."

08:30:00. 157: "155, check your ground track. You are off track right."

08:30:30. (Major Zadorozhnyy's crew) Navigator: "Drift angle plus 15." Commander: "Plus 15? Navigator, recheck that."

08:30:51. Navigator: "Corrected by RSBN [Local Radio Navigation System]. Verifying by radar reference points."

08:32:00. Navigator: "I can't see any reference points."

08:34:05. Navigator: "Commander, request our exact location from the aircraft trailing; system malfunction."

Had the equipment in fact malfunctioned? No, it had not. We shall presently discuss why the navigator reached an erroneous conclusion. Right now we shall analyze the first part of the above radio communications. They indicate that upon departure officer Zadorozhnyy's crew proceeded incorrectly, executing a left turn instead of the specified right turn. This also brought the aircraft dangerously close to one another.

Events en route developed as follows. Upon crossing an en route waypoint Capt F. Afanas'yev gave the pilot a heading which did not include a drift correction angle. The navigator then proceeded to enter the flight program into the integrated flight director (PNPK) computer. Major Zadorozhnyy, concentrating his attention on maintaining the new altitude and airspeed, failed to hold the prescribed heading. None of the crew members noted this. The fact was discovered only upon later examination of the flight recorder data. In addition, the aircrew failed to consider change in weather conditions. In the meantime the winds aloft picked up, and the drift angle increased to 8 degrees. Imprecise actions by the crew members also resulted in the aircraft excessively wandering off its ground track.

How was the integrated flight director system operating? The equipment automatically sensed and recorded all errors. The aircraft's ground track deviation was clearly indicated on the electronic display.

After entering the flight program the navigator, noting the course deviation, made a correction of the computed coordinates from the local radio navigation system. The electronic display confirmed the error. Captain Afanas'yev could not believe it, however, deciding that the considerable lateral deviation from track was due to a PNPK malfunction. The navigator attempted to make a coordinate correction using the airborne radar but, suspecting a PNPK malfunction, he was unable to spot a radar reference point. Subsequently, utilizing backup instrumentation, Captain Afanas'yev became convinced of the navigation error. He determined the heading correction and returned the aircraft to the correct ground track.

Thus the crew of a large aircraft committed two gross errors on a single flight. One of them led to the aircraft coming dangerously close together near the airfield, while the other resulted in failure to maintain the specified en route track. Maj A. Zadorozhnyy is primarily to blame for these dangerous errors. His inadequate personal preparedness for the specific mission and his poor psychological conditioning were manifested rather clearly here. But the aircrew also included the navigator, Capt P. Afanas'yev, and the copilot, Lt V. Loskutov. It was their job to monitor the gauges. Captain Afanas'yev, after giving the command to commence the turn, should have checked to verify that the turn was being executed correctly and that the aircraft had turned to the specified heading. He failed to do so. In addition, when working on entering the flight program into the flight director computer, the navigator should have informed the aircraft commander of this, so that the pilot or his copilot could assume the navigator's functions temporarily. There was evident a lack of coordination in the actions by the crew members.

We should note that the other crew members should also be familiar with the general flight execution procedures. Therefore prior to departure the pilot briefs his crew on the sequence of performance of the assigned mission. Taking into consideration the level of training and specific features of each individual, officer Zadorozhnyy also should have analyzed in greater detail the sequence of their actions during the most difficult segments of the flight: plotting the departure maneuver, significant changes in flight parameters, and en route procedures. He limited himself prior to this unsuccessful flight to the standard phrase: "Mission without changes." We should also state that the aircraft's radio operator was present at the mission briefing and during mission preparations. But the flight technician and aerial gunner, as required during preliminary readying procedures, were on the field and readying the aircraft for departure. Both had only general knowledge of the forthcoming extended flight.

If the pilot had proceeded prior to departure as is required by guideline documents, he would have given priority to going through everything again himself and would not have deviated from the designated route, onto which he was to make a right turnout. The aerial gunner also should have given additional assistance: prior to a maneuver it is his job to check the airspace and report whether the three-nine line is clear and state the direction of turn. WO I. Loshchenok failed to do so, although the navigator had stated the direction of turnout, and the commander had repeated it.

And what about Lt V. Loskutov? He was unprepared both as a pilot and as a navigator. Aware of his assistant's inadequate level of preparation, prior to departure Major Zadorozhnyy should have devoted maximum attention to him. This young officer, just recently out of school, during the entire flight did not say a single word pertaining to the mission. Even when the air situation became seriously complicated, he gave no help whatsoever to the pilot. In addition, as Loskutov subsequently explained, in order to "make his job easier," he had lowered the volume on the aircraft intercom and had not heard communications from the ground and the following aircraft.

The following aircrew, which was led by a leader-personnel officer-pilot, also showed subpar performance. Crew members observed all the incomprehensible maneuvers of the lead aircraft, but they failed to give prompt and proper assistance to Major Zadorozhnyy and his men. The same can be said of the air traffic control people, who were lax in monitoring aircraft in their control responsibility areas. The flight operations officer did not notice the error by officer Zadorozhnyy's aircrew until 2 minutes and 18 seconds after it occurred. During this time the aircraft had not only executed a turn in the opposite direction but also had come dangerously close to the heavy aircraft behind it. And yet the flight operations officer had hundreds of hours of ATC experience behind him.

Scrubbing the mission would have been the most advisable decision following Major Zadorozhnyy's first gross error: the error had psychologically damaged the aircrew, and a successful outcome of the flight was in question, which was subsequently confirmed. Unfortunately things were done differently. This resulted in a second serious, potentially dangerous air situation.

The unsuccessful flight was a strong lesson both for unit flight personnel and for Major Zadorozhnyy's crew. A detailed analysis was conducted of organization of preparations for the mission, incorrect actions by the crew members of the dangerously close aircraft, and measures were taken to prevent future errors. Although officer Zadorozhnyy's men are presently serving in various aircrews and are doing a good job, they have not forgotten the possible consequences of carelessness in preparing for flight operations.

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PSYCHOLOGY JOURNAL REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 30-31

[Article, published under the heading "On the Pages of PSIKHOLOGICHESKIY ZHURNAL," by Lt (Res) V. Artamonov: "Our Psychological Reserves"]

[Text] One can scarcely exaggerate the role of psychology in various areas of human activity, particularly in aviation and astronautics. The problems connected with psychology are widely discussed in the literature, including in PSIKHOLOGICHESKIY ZHURNAL [Psychology Journal] of the USSR Academy of Sciences (published bimonthly since 1980). This journal contains interesting articles on problems of psychology, in particular on problems of psychological preparation of aviators and cosmonauts, book reviews, and brief scholarly articles.

This journal carried an interesting article by G. Beregovoy entitled "Psychological Training -- One of the Most Important Factors in Improving Safety of Space Missions." In this article the author particularly stresses the role of psychological training of crews in ensuring mission safety. The author notes that there have been instances where investigators, who were unprepared psychologically for the potential effect of the external environment, have prematurely terminated an experiment. Confusion, passivity, lack of will, fear, pain, a feeling of isolation, and other psychological factors can lead to crew member illness or even death.

Beregovoy cites examples attesting to the high level of training and preparedness of the Soviet cosmonauts. He writes: "This was manifested most instructively in the forced landing by cosmonauts V. G. Lazarev and O. G. Makarov on a steep, snow-covered mountain slope. The stress of an emergency landing involving high G-loads was not aggravated by the additional stress presented by desolate, rugged terrain, since the cosmonauts had winter-trained in a forest environment. The crew displayed courage and fortitude in successfully handling this very difficult situation."

No less tenacity and fortitude were required of the spacecraft crew consisting of V. D. Zudov and V. I. Rozhdestvenskiy, who made an unplanned night landing onto a partially-frozen salt lake. The psychological preparation they obtained in the process of training drills at sea enabled them not to be caught unawares, and consequently they were able to act efficiently and correctly.

Continuing the discussion of this topic, as it were, Chief Mar Avn B. Bugayev and Doctor of Technical Sciences A. Prokof'yev, in an article entitled "Psychological Aspects of Preventing Aircraft Accidents," share their observations on enhancing man's role in ensuring flight operations safety.

In an article entitled "Moral-Political and Psychological Preparation for Space Missions," USSR pilot-cosmonaut P. Klimuk discusses space flights of recent years, which have marked the beginning of a new stage in the exploration of space -- a stage of manned missions by international crews, increased cosmonaut stay in orbit, and expanded volume of scientific research and testing activities. He emphasizes that in order to ensure reliability of execution of increasingly more complex and critical tasks, it is necessary continously to improve the moral-political and psychological training of cosmonauts. The author discusses the forms of such training, methods of instilling confidence in one's own abilities, developing the capability to maintain neuropsychic stability and a high level of work efficiency in conditions of weightlessness and restricted mobility. Considerable attention is devoted to predicting a crew's neuropsychic status, selecting a crew according to the principle of psychological compatibility, and devising measures pertaining to cosmonaut psychological support on an extended mission. Klimuk writes: "By subjecting cosmonauts to the effect of various kinds of stresses, on the one hand their emotional-volitional stability is tested, and on the other hand the psychological qualities needed for space flight are formed and reinforced."

The journal contains a review of Soviet and foreign literature on space psychology, titled "Studies in Space Psychology." The journal also publishes considerable materials connected with airplane and helicopter flight. Of particular interest is an article by Doctor of Medical Sciences V. Bodrov and Candidate of Psychological Sciences N. Luk'yanova, entitled "Personality Features of Pilots and Occupational Efficiency."

Obviously no specialist can limit himself exclusively to narrowly specialized subject matter. Persons working in the field of aviation and astronautics will unquestionably have interest in publications which investigate, for example, the role of medical psychology in preventing and treating ailments, as well as other materials which expand one's knowledge in the field of psychology.

The following sections are featured in PSIKHOLOGICHESKIY ZHURNAL: "Theoretical and Methodological Problems," "Experimental Investigations," "Psychological Science and Practical Applications," "History of Psychology," "Scientific Articles by Young Scientists," "Abroad," "University of Psychological Knowledge," "Psychology and Economics," plus others.

This year's Issue No 5 contains an article by A. Kronik and Ye. Golovakha entitled "Psychological Age of the Individual." We know that three ages exist -- chronological (how many years old a person is), biological (how well a person is preserved), and psychological (how old a person feels). This article analyzes the mechanisms of a person's subjective assessment of his age. A person's psychological age, which is grounded on a person's notions of his anticipated life span and the correlation between the psychological past, present, and future, is viewed as one of the features of formation of "sense of

age." What mechanism lies behind the fact that chronological age sometimes entirely loses significance in a person's inner world? The concept "anticipated life span" contains two components: years already lived, as a measure of the past, and years to be lived, as a measure of the future. Self-appraisal of age is a correlation of the past and future. Subjective appraisals are grounded on the mechanisms discussed by the article's authors.

PSIKHOLOGICHESKIY ZHURNAL continues to search for new forms of presentation and new topics. Plans for the future include more coverage of the activities at this country's psychology establishments and their research results, as well as the work being done by individual psychologists. The aviation reader can find many interesting articles, which unquestionably will help him broaden his knowledge in the field of psychology.

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CAUSES OF AIRCRAFT LONGITUDINAL OSCILLATIONS EXPLAINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 32-33

[Article, published under the heading "Practical Aerodynamics for the Pilot," by Engr-Lt Col Ye. Vostrikov: "Aircraft Longitudinal Oscillations"]

[Text] A pair of fighters were practicing simple maneuvering in the practice area. They executed horizontal maneuvers in a specific sequence. The wingman was precisely maintaining parameters. The pilots then proceeded to perform vertical maneuvers. On entering a dive, the wingman allowed himself to fall back somewhat and, attempting to make a slight correction, pulled his aircraft tight left and, maintaining visual contact with the leader, began catching up with him. Upon banking back to level, the aircraft found itself in the wake turbulence of the lead fighter. The aircraft was thrown downward. The pilot responded by vigorously pulling back on the controls. The aircraft shot upward, pushing the pilot hard into his seat. Controls forward -- the aircraft dove with even greater amplitude, controls back -- it climbed upward with an increasing G-load. The oscillations ceased only when the pilot held the controls in a neutral position.

What had happened? What caused the fighter to do this?

Practical experience indicates that aircraft longitudinal oscillations in flight can be caused by incorrect pilot control movements in certain flight modes, malfunction of certain control system components, exceeding control system parameters, and external disturbances affecting the aircraft. As is evident, there are many causes of these longitudinal oscillations. Of course in analyzing flight recorder data, specialists should determine first of all whether it was an error in flying technique or a spontaneous aircraft oscillation. We shall examine with specific examples the sequence of analysis of flight recorder data in order to determine the causes of longitudinal oscillations.

Figures 1 and 2 contain flight recorder data from two fighters which experienced longitudinal oscillations. At first glance the two tapes are similar in the oscillatory nature of change in stabilizer deflection angle and normal load factor. But this is only an external similarity. One must analyze the situation in which the oscillations occurred, the tasks performed by the

pilot during the given flight, estimate the parameters of the pitch control system, and thoroughly study information provided by the pilot.

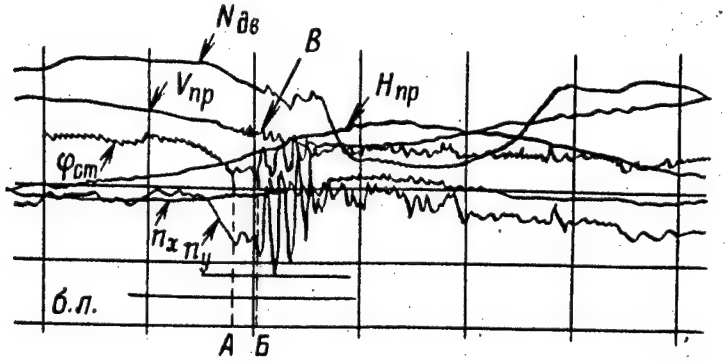

Figure 1. Record of Parameters on Flight Recorder Tape During Oscillations by Aircraft No 1.

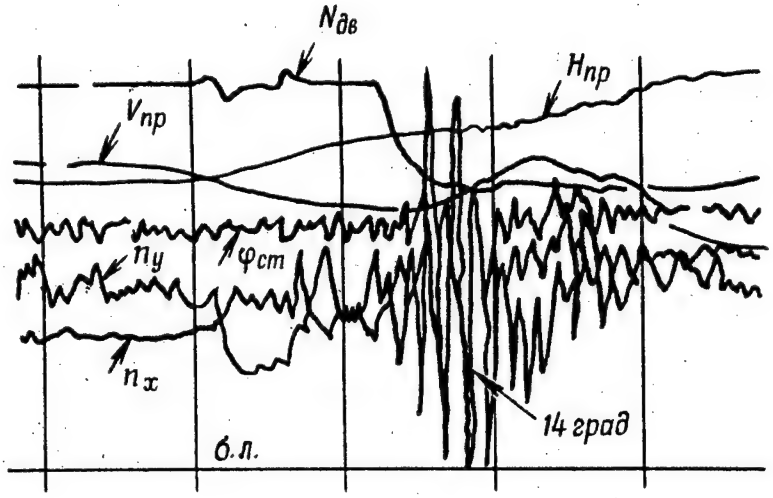

Figure 2. Record of Parameters During Oscillations by Aircraft No 2.

In analyzing the flight recorder tapes, the specialists first determined flight conditions and maneuvers being performed prior to commencement of the oscillations and evaluated the features of change in aircraft pitch stability and controllability characteristics. They then determined the correlation between stabilizer deflection angle and normal load factor just before and at commencement of oscillations, the interlinkage between stabilizer deflection angle and normal load factor under conditions of oscillations, and then quantitatively and qualitatively evaluated the altitude, airspeed and rpm records before and during oscillations.

It is evident from the results of flight recorder analysis (figures 1 and 2) that the oscillations appeared during descent with acceleration at speeds of 800-950 km/h and at altitudes of from 2,000 to 3,000 m. On this basis some experts were inclined to believe that the pilots had failed to take into account

the specific features of behavior of their aircraft in the conditions which had been created, Endeavoring to maintain the strictly specified flight conditions, by abrupt and excessive pitch control movements they put their fighters into oscillation. Their subsequent actions were correct: after placing and holding the controls in a position close to neutral and reducing speed, the aircraft ceased the oscillations.

In this range of speeds and altitudes an aircraft with a controllable stabilizer shows heightened response to small stabilizer deflections (is excessively sensitive). In connection with this, quantities x^{n_y} (control movement per unit of load factor) and p^{n_y} (force applied to the controls per unit of load factor), which characterize pitch controllability, decrease with an increase in airspeed, and the aircraft becomes more control-sensitive. If in these conditions a pilot applies abrupt and frequent control movements, he may put the aircraft into oscillations. Physically it consists in the fact that with an increase in speed there is a decrease in the aircraft's period of natural oscillation:

$$T_{co6} = 2\pi \sqrt{\frac{-I_z}{57{,}3\, m_z^{c_y} C_y^{\alpha} q\, S\, b_A}}.$$

This oscillation frequency is determined chiefly by moment of inertia I_Z, static pitch stability $m_z^{c_y}$, and dynamic pressure q. At high subsonic speeds and low altitudes, when q reaches high values, it becomes commensurable with the pilot's response delay time. Calculations made with this formula for the first and second aircraft, which experienced oscillations, indicated that these periods almost coincide in time with the amount of pilot response delay. Normal load factor increases considerably with an abrupt backward movement of the controls. Attempting to counter it, the pilot pushed the controls forward, but this movement coincided with the moment of the aircraft's reverse oscillatory motion cycle and only worsened the situation.

The picture would seem to be clear: the pilots themselves promoted the development of oscillations -- further analysis of the flight recorder tapes, however, indicates something else. The experts evaluated the correspondences between stabilizer deflection angles and normal load factor just prior to and at the commencement of oscillations. Analysis of the tapes of the flight parameters of the first aircraft (Figure 1) indicated that two identical stabilizer deflections into dive were recorded just prior to oscillations (Figure 1, positions A and B). In the first instance (A) normal load factor decreased to 0.3, and to-0.5 in the second (B). As calculations indicated, with repeated stabilizer deflection the normal load factor should have reached 0.2-0.3, but it decreased to -0.5. An additional increase in $\Delta n_y \approx 0.7$ into a dive may be due to the effect on the fighter only of external disturbing factors connected with turbulence of the air mass.

The fact that at the commencement of oscillations the aircraft was affected by external disturbances is also confirmed by blurring and high-frequency oscillations of the indicated airspeed record (position C).

In view of the fact that the first aircraft was flying in a two-ship formation with a wingman, two reasons for the occurrence of an additional negative G-loading were assumed: the increase in Δn_y is caused by increased atmospheric turbulence in the practice area, and the aircraft entered the leader's wake turbulence. In order to obtain an unequivocal answer, they analyzed the flight leader's flight recorder data. It was determined that no external disturbances were affecting the leader during the scrutinized flight segment. Thus the jump in the wingman's Δn_y was caused only by the fighter entering the wake turbulence. In this case the aircraft is acted upon by additional forces and moments. Their magnitude and direction are determined by the mutual position of the aircraft and their size correlation (Figure 3): A -- entry into one of the wingtip vortices on a trajectory parallel to the line of the vortex; B -- aircraft in the plane of the centers of the vortex cores; parallel to and precisely between them; C -- intersection of the turbulent wake in the plane of the centers of the vortex cores at a right angle to their axis.

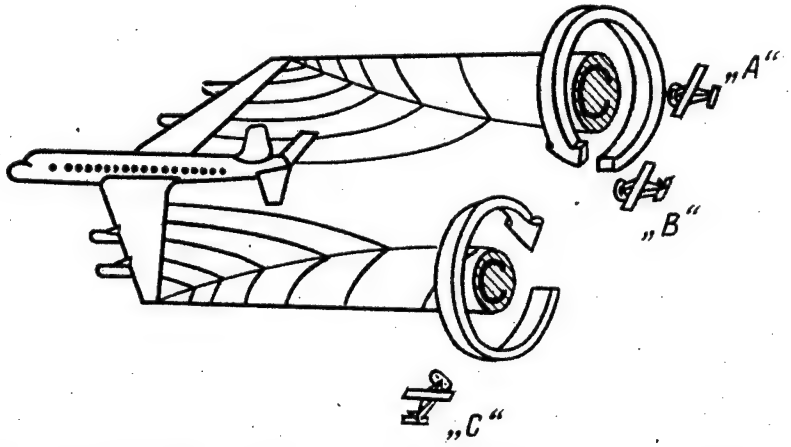

Figure 3. Diagram of Possible Instances of Wake Turbulence Effect on an Aircraft.

In configuration A the danger lies in the fact that rolling moments occur, caused by vertical components of the flow velocities, induced by the wingtip vortices. In position B, when the wingman enters the plane of symmetry of the leader (between vortices), downwash on the left and right wings is symmetrical, and rolling moment is zero. Only a diving moment develops, which requires additional trim. In configuration C the aircraft enters a zone of disturbances analogous to the effect of vertical wind gusts, which lead to a change in pitching moment and normal load factor. The second of these three configurations is most characteristic of the first aircraft. This is also confirmed by the account of the pilot, who did not note any roll oscillations but felt only the aircraft's nose pitch down.

Entering wake turbulence does not necessarily lead to longitudinal oscillations. If a pilot responds correctly to the situation, it can be avoided. Figure 4 contains a flight recorder tape which indicates the aircraft's entry into the leader's turbulent wake. The pilot responded correctly: he did not proceed to counter fluctuations in normal load factor but, holding the controls in a position close to neutral, flew the aircraft out of the turbulent zone (Figure 4, Segment A-A).

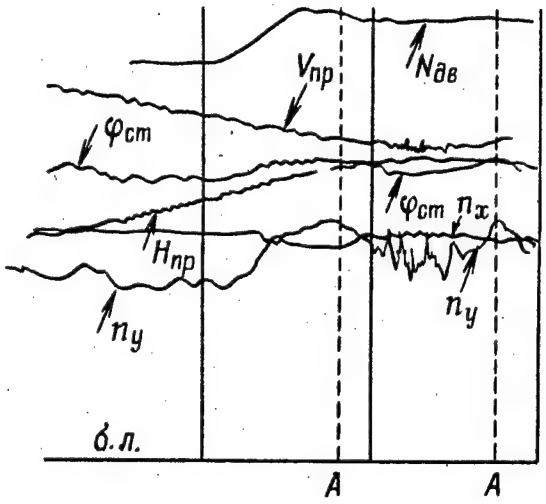

Figure 4. Record of Parameters During Effect on Wingman by Leader's Wake Turbulence.

Analysis of the record of the second aircraft's flight parameters just prior to oscillations showed that normal load factor is fully in conformity with stabilizer deflection. To determine the cause, the segment where oscillations occurred was scrutinized. It was determined that the stabilizer dive deflection angle reached 14°. But at the recorded altitude and airspeed it should not have exceeded 8°. Thus the automatic device which changes the ratio between controls and stabilizer and rigidity of the G-loading mechanism in relation to altitude and speed ceased to function properly. It became difficult for the pilot correctly to match the amount of movement of the controls and force applied to the controls. Intervening into the control process with the delay characteristic of a human operator, he put the aircraft into oscillation.

It is evident from the above example that longitudinal oscillations can be caused by a number of factors. In order to determine the actual cause it is necessary to conduct a combined investigation, basing the study primarily on flight recorder data, as well as the results of checking the condition of the control system and the pilot's (aircrew's) account.

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REALISTIC SIMULATED COMBAT ENVIRONMENT AIRCRAFT MAINTENANCE TRAINING URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 34-35

[Article, published under the heading "Know-How of the Best Into the Combat Arsenal," by Engr-Maj V. Vorob'yev and Engr-Maj (Res) V. Trifonov: "According to the Highest Criteria"]

[Text] The range of tasks performed by the aviation engineer is broad: servicing and maintenance of modern airplanes (helicopters), maintaining them in a continuous state of combat readiness, training and indoctrination of aircraft maintenance specialists, conduct of technical drills and training classes with flight personnel, and improvement of training facilities. Every day they are faced with a great many other problems as well!

This article will discuss the busy life of the engineer and his role in organizing combat training of aviation personnel and broadening their technical knowledgeability, as well as the campaign for flight safety. The authors of this article served many years in aviation units, headed various aviation engineer services, and have amassed a wealth of experience. Presently one of them, just as his colleague until recently, as a member of various commissions, continues frequently to visit line units and by virtue of his job thoroughly examines the state of affairs and studies advanced know-how in servicing and maintenance of modern aircraft.

In a Near-Combat Situation

Flight operations were in progress. The weather was bad: there was an annoying, persistent drizzle, with gusting winds. It was after midnight. We entered the squadron maintenance shack, where the aviation engineer service specialists, for the most part young men, had gathered. We listened to their discussion, endeavoring to follow the main points.

Aircraft senior technician officer V. Meshcheryakov was talking about mistakes personnel sometimes make in equipment servicing and maintenance. Can they be avoided? One of the men voiced the opinion that the more training sorties an aircraft has flown, the greater the probability of mistakes. This is due to

the fatigue, lessening carefulness, diminished vigilance, etc which occur toward the end of a flight operations shift. Officer A. Butov saw as the stumbling block inadequate moral-psychological and physical conditioning on the part of aviation personnel. He had thought about this a good deal and had reached the conclusion that neither night hours, nor weather, nor fatigue can justify mistakes by ground crewmen during flight operations.

Everything depends on the individual, his attitude, volition, self-discipline, and the extent to which he acknowledges his responsibility for the assigned task.

I must admit that we were quite pleased at the sober-minded reasoning and firm position taken by party member A. Butov in this matter. We offered our support, stating our opinions and relating the experience of the top maintenance specialists. The young men had brought up a very interesting and important subject. And who if not engineers should resolve these matters? Without firm moral-psychological conditioning, self-discipline, and a sense of personal responsibility for carrying out one's military duty, it is impossible to ensure reliable aircraft operation and a high degree of combat readiness of the subunit and unit as a whole.

Unfortunately for some reason none of the participants in that impromptu discussion gave thought to how difficult it will be for people in actual combat conditions.

We shared our views with the regiment's deputy commander for aviation engineer services, officer M. Pedenko. He listened attentively to what we had to say, and he suggested that general meetings be held in the squadrons and technical maintenance unit, at which they would discuss with the men the complexity of the international situation, the moral-fighting qualities of the military aviator, and the readiness and willingness of each and every ground crewman to service aircraft in any and all conditions. We agreed that the presentations should be specific, contain actual combat experience, and reflect today's tasks.

Preparations for the meetings began in advance. Our colleague Engr-Lt Col M. Pedenko has a great deal of experience in servicing and maintenance of aircraft in various conditions. We asked him to share his experience. Mikhail Gerasimovich readily agreed. Engr-Capt V. Dolgov suggested that veteran pilots officers Yu. Leonov, Ye. Starovoytov, V. Pisarenko, and D. Bazarov, Engr-Maj V. Rybakov, chief of an excellent-rated technical maintenance unit, and supervisor personnel from support subunits be invited to the meetings. They decided to hold a combined training drill for aviation engineer service specialists in near-combat conditions, in order to ensure that the discussion and the meetings be practical and to the point, with an analysis and requisite conclusions.

Personnel were ordered to assemble at the end of the workday. The commander assigned to the technical maintenance unit personnel the task of performing servicing and maintenance procedures on an aircraft, quickly making it flight-ready. Preflight activities were simultaneously in progress in the squadrons.

All ground crewmen were compelled to operate in a very complex situation. We served as umpires in this training drill.

The aircraft was already standing at a field location prepared in advance. The scenario instructions were given: maintenance crews were to work on a relief basis. The technical maintenance unit specialists worked with precision, knowledgeably and swiftly. Those who were not involved in a work assignment remained in the shelters. Group chiefs Capts Tech Serv V. Abramov, L. Kiselev and others skillfully directed their men, without undue haste or bustle.

During a break Engr-Maj V. Rybakov briefly summarized march performance. He directed attention to the necessity of economical consumption of electric power in field conditions and mentioned an instance when several teams of maintenance personnel were working simultaneously on the aircraft and the storage batteries were not supplying enough power.

Midnight came, unnoticed. The aviation engineer service specialists received new scenario instructions. It was necessary to check how the young maintenance personnel would conduct themselves. Therefore in the radio and electronic equipment groups veteran mechanic V. Kovalev and officer S. Shikunov were temporarily "disabled." Naturally the work load on the others increased. Monitored by supervisor personnel, the young officers and warrant officers successfully accomplished their task.

The maintenance specialists also responded with confidence and assurance to other scenario instructions. They worked with a high degree of effectiveness, backing one another up.

Things were progressing less well in the squadrons. For example, not all the men were observing blackout procedures, and not all the mechanics had on hand aircraft preflighting procedures cards. Some individuals prematurely removed their protective ensemble. There also occurred errors in organization of coordination between aviation engineer service specialists. As combat experience indicates, in a difficult situation this can lead to undesirable consequences.

Perhaps not every individual performed with assurance in the combined training drill, but personnel did test themselves in a difficult situation and acquired certain skills in readying aircraft in near-combat conditions.

Several days later meetings were held in all subunits. These meetings discussed maintaining aircraft equipment and weapons in a continuous state of combat readiness. The discussion was specific and to the point. Many of the men made suggestions and shared experience and know-how in servicing aircraft systems.

The valuable suggestions were later discussed at a meeting of the methods council. Practical conclusions were also drawn. In particular, it was noted that most maintenance specialists possess totally adequate skills in order successfully to accomplish a mission in a complex situation and with an acute

lack of time. A great deal remains to be done, however, to improve moral-psychological conditioning. To achieve this it is necessary more frequently to hold combined training drills at the airfield. And they should be conducted with reduced-strength crews and should be of longer duration.

The formulated recommendations were implemented in due course. Results were encouraging: regimental aviation engineer service personnel achieved good success in training and, what is especially important, acquired good skills in readying aircraft for sorties in today's intense, dynamic combat environment.

Engineer and Pilot

Our regiment's pilots were proud of the simulator equipment. "You can't find a better simulator than ours," they would say. Perhaps they were somewhat exaggerating its merits, but the simulator was truly deserving of praise. It enabled the pilot to practice procedures from takeoff to landing in a realistic situation.

Once we glanced into the classroom following a class session. Engr-Capt V. Dolgov was sitting in the simulator cockpit, sunk in thought. He told us that, having pictured the operation of complex aircraft equipment in the air, he had arrived at the conclusion that a pilot has no time to spare, but that in an actual cockpit there are more devices for controlling and operating the equipment with which he works. Consequently simulator training does not produce the requisite effect.

That same day we discussed the matter with the pilots and listened to their suggestions.

"Could you stay for a minute?" Engineer-Captain Dolgov asked us after we completed our work. "I have an idea...."

We discussed together an interesting suggestion. The idea began to be embodied in a diagram and drawings. We sketched out one version, a second, and a third.... We chose the optimal version. Here is what it entailed. The simulator cockpit contained an inoperative radar, which just sat there. It should be "revived." And a second unit should be installed. In addition to the panels and switches, we would provide simulation units and monitoring panels for the pilot-instructor. In addition, they should provide a capability to determine errors in the pilot's flying technique. When they had completed the diagram, they enlisted the services of Lt Tech Serv S. Shikunov and simulator mechanic Jr Sgt A. Dubrale.

Finally the long-awaited day arrived. The power was turned on. Pilots and engineers bent over the panels. Various-colored lights began to wink on. The equipment was functioning normally! After several checks the pilot and instructor took their places and worked on the procedure of employment of the complex airborne equipment in flight.

"Forgotten" Aircraft

Maintenance days play an important role in ensuring high reliability of aircraft equipment, squadron and unit combat readiness. But are they conducted in a sufficiently well organized manner, and do they produce the requisite effect?

Sometimes so-called "forgotten" aircraft are discovered. On one occasion two turned up in the regiment at the same time on a maintenance day. Both were buttoned up, with protective covers on. One maintenance technician had just been added to the duty detail, while another had fallen ill. It turns out that the maintenance day schedule failed to be completed on their aircraft. And yet next time the maintenance specialists will be doing other work on the aircraft. Perhaps there will be another "forgotten" aircraft. No, that cannot be tolerated!

Discussing the matter, we decided to perform the requisite preventive maintenance on both aircraft during servicing procedures. And a check sheet was adopted in order to improve the quality of preventive maintenance on maintenance days. It is true that it is not specified by guideline documents, but experience has confirmed that the adoption of a check sheet is entirely warranted. The aircraft avionics servicing group chief marked down on the check sheet those aircraft on which he and his maintenance people had done work, as well as discovered malfunctions. The sheet also contained the following columns, for example: method used to correct problem, name of mechanic and inspector. The engineers subsequently utilized all this information at technical analysis sessions, at which the discussion was specific and well-reasoned. The common cause -- subunit combat readiness -- gained a great deal from this.

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PRACTICE ESSENTIAL FOR KEEPING FLYING SKILLS CURRENT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 36-37

[Article, published under the heading "Constant Attention to Flight Safety," by honored military pilot USSR Maj Gen Avn A. Dolgikh: "When Practice Is Neglected...."]

[Text] Thorough knowledge of one's aircraft and its peculiarities as well as a consummate mastery of that aircraft comprise the foundation of a pilot's psychophysiological stability in performing a mission and guarantee reliability of his actions at any stage of a mission, as well as in emergencies.

Famed pilot M. Gromov, who tested more than 300 aircraft of various types, found himself in critical situations on numerous occasions, but he always emerged the victor. How was he able to do this? Replying to this question, the test pilot wrote: "I spent a great many hours sitting in the cockpit, running through all possible and impossible situations which might occur in the air." In the course of his long career in aviation, M. Gromov became convinced that the causes of many pilot errors are to be found not so much in a pilot's inadequate technical training as in psychophysiological inadequacy. The way to overcome this is through drill and practice, a tireless search for optimal solutions.

Indeed, the higher the level of preparation of the combat pilot and the more frequently he flies in a complex situation, the more confident and aware his actions will be in extreme conditions. At the same time emotional stability and the ability to control one's attention and volition regardless of the complexity of the situation exert considerable influence on the outcome of a flight. Precisely for this reason psychological preparation on the ground, before takeoff, is essential.

It would seem that the need for simulation training and drill would be clear to everybody. And yet one sometimes encounters underrating of these activities during analysis of the causes of errors made by pilots and crew members which have resulted in a near-accident situation. And, strange as it may seem, this shortcoming is more common in the more experienced pilots.

In one of the units squadron deputy commander Maj A. Karpushin landed his aircraft alongside the runway. This experienced pilot had almost caused a serious mishap, and in good weather to boot! An inquiry brought to light the fact that a specific reason could be found behind this "suddenly": failure properly to appreciate the value of regular practice shooting landing approaches in the simulator and in the aircraft. In addition, it had been a while since Karpushin had logged flight time. Overrating his own ability, he had neglected to refresh his lost skills, and consequently had failed to obey the regulations governing flying service, giving a poor example to his subordinates.

Unfortunately this is not an isolated instance. Something similar took place in this same regiment, involving another experienced pilot, a squadron commander. He flew a great deal, flew intrepidly, but gradually became less demanding on himself and stopped honing his flying technique, especially his landings. The regimental commander repeatedly drew his attention to errors on figuring the approach and on landing, his nervousness in flying in bad weather, and reproached him for neglecting landing approach practice and practicing actions in emergency situations and for uncritically appraising his own flying proficiency. The squadron commander would usually retort: "But my pilots and I log a great deal of time on the simulator!"

There was a bit of truth in his statement, but only a bit. He spent most of his simulator time at the "flight" control console or as an observer. But he did not personally fly the simulator. He felt it was unnecessary. And then it suddenly happened that he had difficulty landing once at minimum ceiling and visibility, bringing his heavy ship down hard onto the concrete runway. This was a dangerous near-accident situation!

After this incident the regiment command resolved thoroughly to test the squadron commander's level of flying proficiency. The officer displayed thorough knowledge of flight dynamics, emergency procedures, and flying technique. The pilot was quite proficient in theory. He was confident that his bad landing was purely a chance occurrence.

In order to convince this officer that he was dead wrong, the unit commander decided to conduct an experiment. He summoned regimental leader personnel and instructed the squadron commander to fly a mission on the simulator. On his landing approach they dialed in the same conditions in which his dangerously hard landing had occurred. The "flight" ended with a repetition of the dangerously bad landing. The embarrassed pilot climbed out of the simulator cockpit. He stated: "You don't need to say any more. I got the point."

This was a useful lesson.

After analyzing a number of near-accident situations, the regimental methods council formulated a new flight training method which was more rigid from the standpoint of organization and discipline. If a pilot's performance has declined to a mark of three, he would be grounded. A great deal of indoctrination work, persistence and firmness was needed on the part of commanders and political workers. Only then did the recommendations of the methods council truly become a rule for each and every pilot, regardless of his position.

Flight surgeons Lt Col V. Savchuk and Maj V. Pikalovich greatly helped increase the effectiveness of training activities. Efficiently utilizing the "Physiologist" instrument in the psychophysiological training system, they were able to improve things in the unit to the point where flight personnel began having a more responsible attitude toward practice flying and their psychophysiological state. Working in close contact with one another, the flight surgeons and military pilot-instructor 1st class Major Tochilkin discovered in a prompt and timely manner deficiencies in the moral-psychological preparation on the part of certain young combat pilots and helped them learn to govern themselves. To date these officers have achieved excellent results in flight training and are doing a good job of commanding aviation subunits.

In IFR weather a pilot flies on the gauges. If he has not had sufficient practice in attention distribution and switching, he is hard put to respond quickly enough to a rapidly changing situation, especially on a zero-visibility landing approach, when he has not yet broken out of the overcast and has descended to the IFR minimum.

Practical flying experience confirms the need for close coordination and mutual understanding between tower controller and airborne pilots. Knowledge of the capabilities of and faith in each pilot help the tower controller make an intelligent decision. On the other hand, confidence in the reliability, continuity and precision of actions by the tower controller team makes crew members more confident in their own ability. As we know, landing an aircraft at IFR minimums is a kind of test of the moral-psychological preparedness and professional skill of crew members and tower controllers. Of course the main actor here is the pilot, with his ability, skills, volition, and emotions. The flight operations officer should never lose sight of this fact. I shall cite the following example.

That night Col V. Ivanov was serving as flight operations officer. The weather was deteriorating. Heavy aircraft were landing, one after the other. Two aircraft, flown by young pilots, were still in the air. Technically their level of training qualified them for landing at IFR minimums, but the flight operations officer, continuously analyzing change in the weather situation, took his time in making a final decision. The instructors of both pilots were urgently summoned to the tower to give their opinion on the pilots' landing capability. One of them, Maj V. Sviridenko, a respected pilot and prestigious educator, was slow in replying. The tower controller immediately radioed aloft: "521, proceed to alternate field...."

The other instructor, Maj B. Tochilkin, stated firmly that his student would have no problem landing. And in fact, in due course his student punched through the overcast and successfully landed his aircraft.

This example shows how important is an innovative approach to controlling airborne aircrews. The flight operations officer knew full well that a night landing at IFR minimums is one of the most critical stages in a flight. For this reason he took an individual approach to each pilot, considering their experience, psychophysiological capabilities, and landing skills.

A question arose: why did Maj V. Sviridenko have doubts about his pupil and unconditionally agree with the tower controller's decision to send the aircraft to its alternate field? After all, both pilots had gone through training at the same time and were prepared to operate at IFR minimums without any problem. Sviridenko offered a unique reply to this question right on the spot, in the tower. He turned to Tochilkin and said: "Yes, Boris, that's the way it is...."

I learned the following.

They always worked together with their students on the simulator. But as a rule Tochilkin started simulator sessions earlier and ended them later. He always felt that he was devoting little time to his students. Pilots would climb out of the simulator, walk over into a corner and continue to debate points, "flying" with their arms. Sviridenko's students, however, for the most part did not overwork themselves and frequently joked about Tochilkin's excessive meticulousness, when he would spend hours drilling his students in one or another set of flight conditions. For this reason the results also turned out different.

"Apparently a pilot's flying skills and mental makeup must be trained like muscles!" stated Maj V. Sviridenko in conclusion, acknowledging his mistakes.

Pilots are well aware how important it is to be confident in the fact that the consoles and scopes at air traffic control facilities are manned by competent, determined specialists, who are capable of assisting a pilot at all times. The word of an air traffic controller has the force of law for a pilot, a command requiring action. But what if suddenly this voice over the radio does not sound commanding or, even worse, if no command is given when it is greatly needed? Does this happen? Unfortunately it sometimes does. And we must not forget gross errors in the performance of ATC teams.

...An exercise was in progress. Following successful performance of missions at a considerable distance from their base, the aircraft were returning home. There was nothing to indicate that a surprise awaited them. At the terminal area handover point, however, the aircrews were not given exhaustive information on terminal area traffic and weather, although they were cleared to enter the terminal control area. The indefiniteness on the part of the tower controllers in providing terminal information should have alerted the aircrews, it would seem. But they decided that everything was running according to plan, and the group commander asked no questions. This was the beginning of the problem situation in which they later found themselves.

"Unfortunately we were not psychologically ready to land at our alternate field," the regimental commander would later explain.

It was precisely the complacency of the ATC controllers in assessing the weather situation at their field which complicated the situation and caused the aircrews to become nervous. For a certain period of time the pilots were without control. Contradictory commands came over the radio. Finally the aircraft were ordered to proceed to the alternate field, where the weather was also bad. Some of the crews had not readied themselves for such a possibility

prior to departure. The tower controllers at the alternate field were in a similar situation. And yet aircrew preparedness to land at an alternate field is a mandatory condition for thorough preparation for a mission.

In the final analysis near-accident situations did occur. And they could have been prevented! All designated personnel responsible for the forthcoming mission should have been thoroughly prepared for it, there should have been a thorough weather analysis, with daily drills for aircrews and ATC personnel, measures which, incidentally, are specified by the combat training plan.

Without any question successful accomplishment of the flight training program is fostered in large measure by proper demandingness toward all persons connected with flight activities, and professional competence on the part of commanders and subordinates. I shall cite another example.

Late one cold winter night a snowstorm was in progress at an alternate airfield. Soon the first blips from the aircraft of the returning group appeared on the radar scopes in the control tower at the destination field. Flight operations officer Col G. Nesterov and his assistant, Col V. Dymchin, rechecking terminal traffic and weather and revising the landing approach to accommodate the aircraft's low-fuel condition, held a brief drill with the tower control team officers on bringing in the combat aircraft.

The lead group would soon be handed over to approach control. But what was this? More blips than anticipated appeared on the scopes. It was soon determined that both groups were arriving at the terminal area handover point at the same time. The reason was unclear. This greatly complicated approach sequencing. Nesterov knew that all aircraft were short of fuel, and there were no other airfields in the vicinity.

The tower controller team quickly addressed the situation. Officers Nesterov and Dymchin displayed a strong sense of responsibility for the fate of the men who were in the air and who were ready and willing to execute their every instruction. Group commanders Lt Cols A. Zaverneyev and M. Bobokha also grasped the difficulty of the air situation. Officer Zaverneyev, anticipating the tower, proposed the only correct solution, which fully coincided with the flight operations officer's decision. Calculating how long they could stay in the air with the remaining fuel, he put his group in a holding pattern at an optimal altitude. This gave the tower controllers time to bring in the second group. When all aircraft were down, they proceeded with Zaverneyev's group.

The senior officer conducted the debriefing right at the control tower. He gave high praise to the actions of the ATC team, to officers Bobokha and Zaverneyev.

But why is it that there still almost occurred a dangerous bunching of incoming aircraft? It seems that the regimental commander and navigator had decided to shorten the route for one group, failing to report this fact to the control tower. The cost of this decision could have been great indeed....

The skies are unforgiving of proficiency shortcomings and a cavalier attitude toward flight operations. It is necessary to prepare for flight operations diligently, rigorously taking into account all the specific features of flight activities. This should become a rule of conduct and necessity for all those who fly aircraft, ready them for flight, and direct the actions of aircraft in the air.

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IMPORTANCE OF EFFICIENT WORKDAY STRESSED FOR AIRCRAFT MAINTENANCE ENGINEER

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[Article, published under the heading "Know-How of the Best Into the Combat Arsenal," by Engr-Maj V. Bendrik, regimental deputy commander for aviation engineer service: "Engineer's Workday"] /

[Text] I once happened to hear an interesting conversation among young officer-engineers. They had been working as aviation engineer service supervisors and were exchanging their impressions about their job. They were also discussing how to plan their workday more efficiently.

One of them said with unconcealed pride that he was dedicating himself entirely to his job, frequently spending late hours at headquarters or at the airfield. This enabled him to come to work the next day with a clear conscience. The young engineer obviously wished to emphasize his diligence and zeal. Another engineer responded in a critical manner, stating that he himself preferred to organize his work in such a manner as to get everything done in the allotted time. Incidentally, the majority held the same view.

Yes, one does frequently hear about so-called "overtime" hours, including from engineers. If one analyzes the matter in detail, however, it becomes clear that primarily to blame are the officers themselves, who have failed to learn how to organize their work properly and efficiently to utilize each and every working hour.

One might retort: Who is able to foresee all "scenario changes" which may crop up in the course of a day? And not only that. The increasing complexity of aircraft equipment has resulted in a substantial broadening of the range of duties on the part of aviation engineer service supervisory personnel, particularly engineers. Some days are so busy that one feels the need to be two or three persons instead of one: one is searching out and correcting some puzzling malfunction on an aircraft, as well as supervising other personnel engaged in preventive maintenance. In addition, instructions have arrived from higher headquarters, execution of which also requires time.

It is quite understandable that disruption of one's working rhythm is unsettling, compelling one to make adjustments in his day's schedule. This cannot justify lack of organization, however.

Practical experience indicates that an organized person, no matter how complicated things may be, will always be able properly to plan and schedule not only his own labor but also that of his subordinates. This is confirmed by the experience of vanguard aviation engineer service supervisors Engr-Capts V. Glushakov, V. Bondartsov, and V. Golubyatnikov. On the day before and during flight operations these officers take active part in performing preventive maintenance aimed at ensuring high reliability of aircraft equipment and give an example of efficient utilization of each and every work hour.

Skill in planning is a delicate and complex matter. A great deal depends on the initiative and innovativeness of the aviation engineer and his endeavor constantly to improve the quality of the job he does. It was stressed at the November (1982) CPSU Central Committee Plenum: "It is essential to create economic and organizational conditions which would foster high-quality, highly-productive labor, initiative and enterprise. And on the other hand, poor work, inactivity, and lack of responsibility should directly and irrevocably affect financial reward, job position, and the moral authority of personnel."

This also applies in certain measure to the activities of aviation engineer service specialists. Comradely help and mutual assistance assumes considerable importance. In our regiment, for example, alongside experienced personnel there are many young engineers, who recently completed their specialized higher education. They include yesterday's maintenance technicians, flight and servicing group technical maintenance unit chiefs. Before completing their higher schooling and new job assignments they performed other jobs, and they had fewer people under them. Becoming aviation engineer service supervisors, they encountered certain difficulties, including in planning and scheduling their workday. In addition to matters connected with aircraft equipment maintenance, an engineer is involved in indoctrinating and training his subordinates, and as a disseminator of technical information he presents lectures and reports to aviation personnel. He also bears on his shoulders concern with improving training facilities and development of economic and efficiency innovation activities. And a great deal of time is required for preparing various documents! And everything must be completed by the specified deadlines. In such conditions sometimes even an experienced engineer has difficulty, let alone novice engineers.

In view of all this, we devote much attention to the development of young engineers and teach them correctly to organize their labor. Toward this end not only commander training classes are utilized, but also technical conferences, critique sessions, brief exercises, and presentations by leading engineers. Officers V. Bondartsov and V. Glushakov, for example, on the recommendation of the regimental methods council, related to recent military educational institution graduates on how best to organize an aircraft inspection, how to perform operation-by-operation inspection more efficiently, plus many other things. Considerable attention was devoted to observing safety procedures, especially during external mounting of ordnance and loading weapons, starting up engines, etc.

Nor have we forgotten that the aviation engineer not only works with equipment but also teaches and indoctrinates his subordinates and helps them improve their professional skills. Not everybody succeeds in avoiding mistakes in this area.

Once Engr-Sr Lt N. Kutuzov was instructed to check the airframe and powerplant maintenance group. The officer submitted his inspection plan for my approval. Everything was scheduled, virtually minute by minute. The engineer of course concentrated his main attention on checking the condition of the equipment. But he provided no time for talking with those persons who ensure the high reliability of all aircraft systems and assemblies and for testing their knowledge, considering this to be a secondary matter. And yet he knew that the group, which had once been known for its excellent results in accomplishing its assigned tasks, had slipped in its performance and had lost the title of competition leader. Some officers and warrant officers were satisfied with past achievements, attempting to rest on old laurels.

It was necessary to point this out to Kutuzov and to advise him to talk with his men without fail, to look into the reasons for work performance failure and to inquire how the specialists were improving their knowledge.

Engineer-Senior Lieutenant Kutuzov took these comments to heart. In the course of the inspection he thoroughly examined the work performance of the technicians and mechanics and thoroughly analyzed planning and scheduling of maintenance operations and fulfillment of socialist pledges. He also attended a party meeting, at which a frank, exacting discussion was held on the reasons for the group's poor showing in competition. Thus Engineer Kutuzov was able not only to reveal errors but also to find latent reserve potential and presented a number of recommendations on improving the state of affairs in the subunit.

Work done by efficiency innovators left a good impression with him. They improved devices and equipment essential for performing maintenance procedures in field conditions. The engineer also drew attention to organization of work procedures on the team assigned to replace engines. This team, headed by Sr Lt Tech Serv V. Ruban, also achieved considerable results in socialist competition. The attained successes helped the men in mastering front-line repair procedures.

But the engineer also discovered errors as well. Questioning personnel, for example, revealed poor knowledge on the part of group senior technician Sr Lt Tech Serv V. Alekseyev, who had received a higher education through correspondence study. He had previously been doing a good job, but recently he had appreciably lessened demandingness on himself and his men. Working on key operations, Alekseyev incorrectly specified tolerances on clearances between control cables and aircraft structural member, and confused other data as well. The engineer not only revealed gaps in his knowledge but also indicated where he should focus particular attention.

Engineer-Senior Lieutenant Kutuzov's help proved to be quite opportune. Subsequently the group's performance noticeably improved.

There are many similar examples. I shall cite one of these. Officer I. Svezhinskiy, inspecting Sr Lt Tech Serv V. Martysyuk's aircraft, discovered a violation of maintenance procedures. Noting that the oil level in the tank was down, the technician sought to add oil to bring the level up, without determining the cause of the oil loss. But this is very important, particularly since there have been cases where in a transition period seals have failed due to an oversight by personnel. As a consequence either oil has leaked out or fuel has entered the system. In order to ensure against an engine failure, it is essential to drain oil from the lower points, measure the oil level, perform a chemical analysis, and test the engine with ground panels connected. But the technician failed to do this.

The aircraft engineer service supervisor pointed out this error of omission to V. Martysyuk and instructed him to study the servicing documents and correct deficiencies. Svezhinskiy made the appropriate entries in his notebook and in the aircraft preflight servicing log. On the following day, after testing the engines in the preflighting sequence, he again checked the work performed by the technician. He noted no deficiencies.

The effectiveness of an engineer's labor and the smooth rhythm of his workday depend not only on a well devised plan and schedule but also on timely and high-quality execution of the individual points in the schedule. Precise organization of the labor of aviation engineer service personnel in turn depends on how the aviation engineer plans his workday. It is essential that each and every engineer be an advocate of scientific organization of labor, display an example of integrity and organization, and teach his subordinates to do likewise. Important reserve potential for achieving further increase in the combat readiness of aviation subunits is to be found in this.

3024
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USE OF PLASTICS IN AIRCRAFT INDUSTRY DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 39-40

[Article, published under the heading "Milestones of the 11th Five-Year Plan," by Candidate of Technical Sciences and Docent Engr-Lt Col Ye. Ivanov: "Plastics in Aviation"]

> [Text] "Develop production of high-quality polymers with predetermined properties, including reinforced and filled plastics, as well as manufacture of plastic pipe and tubing."
>
> "...Increase the manufacture of advanced materials which replace ferrous and nonferrous alloys...."
>
> From the proceedings of the 26th CPCU Congress

The manufacture of plastics has been growing at a rapid pace in the latter half of the 20th century. Plastics are widely employed in modern technology, including in the aircraft industry. This is due both to technical and economic considerations. This is why the importance of further growth and development of this industry was stressed at the 26th CPSU Congress.

As we know, plastics are hard or elastic materials which are obtained from polymeric compounds. Product items are formed by methods based on their inclination toward plastic deformation. The majority of plastics are a mixture of various constituents, one of which is a polymer. Single-polymer plastics -- plexiglass, Teflon, polyethylene, and others -- consist of one polymer. In this instance the terms "plastic" and "polymer" are identical in meaning. Fillers -- glass and organic fibers, wood flour, various fabrics, gases, and other substances -- are added to resins in order to increase the strength of plastics.

Plastics are delivered to aircraft plants as formed products (slabs, tube, plates) and individual constituents. Parts are manufactured by shaping a charge of appropriate constituents by plastic deformation: molding, forming, extrusion, and injection molding.

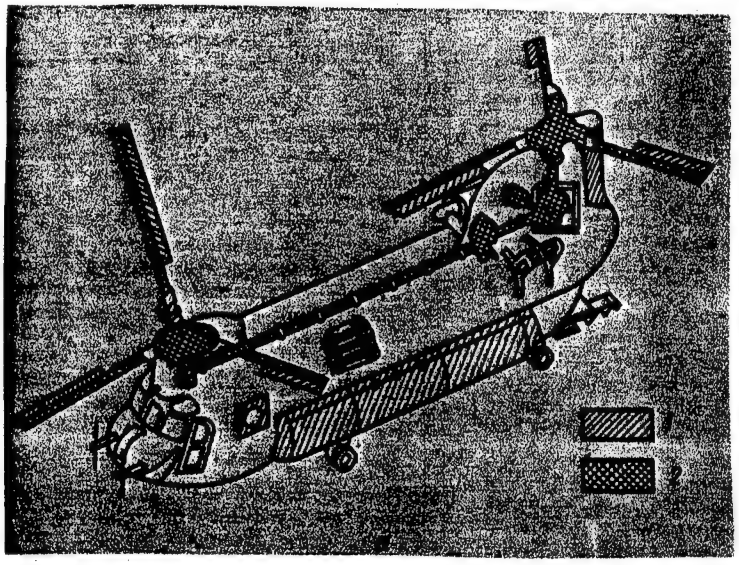
The weight of a finished part comprises 90-95% of the weight of the materials used. Such a manufacturing process, which virtually totally eliminates waste,

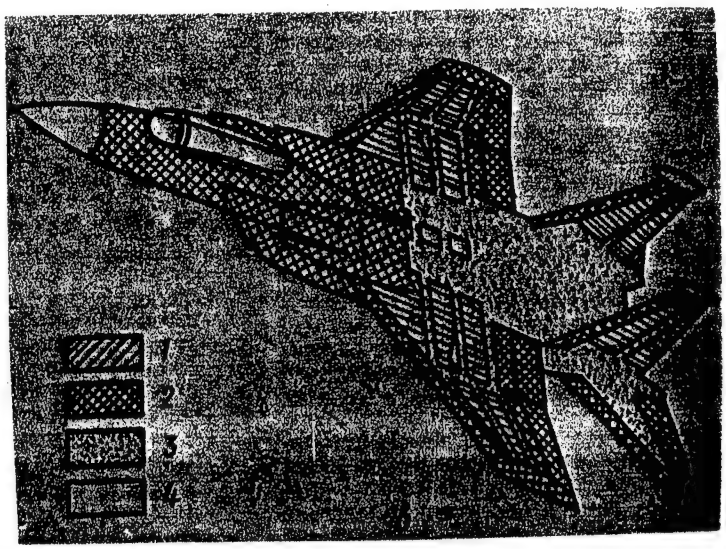
is superior to the processes employed in producing metal parts, which involve casting, heat treatment and machining, each of which contains from 30 to 50 operations. Labor requirements are reduced by a factor of 5-6 in the manufacture of plastic parts, the manufacturing cycle is shorter, and capital spending requirements are reduced by a factor of 4-6.

In addition, use of plastics in aircraft leads to savings in metal. Experience has shown that 1 ton of plastics replaces on the average 3 tons of nonferrous metals. In addition, the density of structural plastics and glass-fiber laminates is only slightly more than two thirds that of aluminum, one third that of titanium, 22 percent that of steel, while the density of gas-filled plastics is only 1 percent that of water.

The mechanical strength of plastics also varies across a wide range. Applying the principles of directivity of filament or fiber filler, Soviet scientists have obtained a tensile strength equal to that of high-grade steel. This is why plastics, with equal structural strength, make it possible substantially to reduce the weight of an airplane or helicopter.

Plastics are used in the Soviet aircraft industry to make radar antenna fairings, three-ply structures for rudders and elevators, ailerons, flaps, panels and bays, wings, stabilizers, fuselage, floors, and bulkheads. The strength-providing elements of these structures are made of glass-reinforced plastics or fabric glass laminates, which consist of suitably oriented, resin-impregnated fiber or glass fabric. Experience has shown that fabric glass laminates and glass-reinforced plastics can be extensively employed for aircraft skin, spar flanges, stringers, and small parts: access covers, boxes, anti-icing and deicing system components, aircraft fuel tank containers, protective panels placed between them, as well as fuel unit flexible diaphragms.





Employment of Materials: a) in a helicopter: 1 -- glass-reinforced plastics; 2 -- carbon-reinforced plastics; b) in a fighter: 1 -- carbon-reinforced plastics; 2 -- aluminum alloys; 3 -- titanium alloys; 4 -- glass-reinforced plastics and plexiglass.

Thanks to good shock-absorbing capability, glass-reinforced plastics are successfully employed in structures subjected to vibration. Frequently they are used together with composite materials, which helps increase aircraft range, speed, altitude, and payload.

The accompanying drawings show employment of glass-reinforced plastics and composite materials in foreign-built aircraft.

Because of the excellent electrical insulating properties of plastics, these materials are widely used in the aircraft industry to insulate wires and high-frequency equipment and radio gear parts. Polyethylene, polystyrene, and Teflon have been put to the practical test. But there is also a new plastic -- polyphenyl epoxy. It possesses dielectric properties, which are independent of temperature and current. Possessing a high degree of specific surface and body electrical resistance, plastics are capable of accumulating a static charge, although for many plastic parts this is undesirable in the process of utilization. In this case antistatic substances, which possess surface-active properties, are introduced to plastics in order to decrease the tendency to collect a static charge. Plastics with antistatic properties are used in the manufacture of tube and pipe carrying explosive substances and flammable liquids.

A number of single-polymer plastics are also extensively employed to protect metals against corrosion. And PVC film is being used effectively as sealed packing for storing and transporting aircraft engines.

Aviation personnel visiting the Exhibit of Achievements of the USSR Economy this year were able to acquaint themselves with the employment of foam plastics in aircraft engineering -- materials with a closed cellular structure. They have proven particularly useful as fillers in the fabrication of lightweight and strong heat-insulating panels, decking, bulkheads, and doors in aircraft, as well as panels for soundproofing aircraft interiors against engine noise. Increased variety of these parts and assemblies in aircraft engineering is targeted in the 11th Five-Year Plan.

Elastic foam plastics such as porolon [poroplast polyurethane, foamed plastic] are an excellent material for upholstered seats, shock absorbers and aircraft decorative items. Passenger aircraft seat frames are made of rigid foam plastics (polystyrene foam, polyethylene foam). They are simpler, lighter, and less labor-intensive of manufacture in comparison with metal frames. Foam plastics are also used for floatplane floats, fuel tank components, lifesaving and rescue gear.

One of the most remarkable synthetic materials is fluoroplastic [Teflon], with demand steadily growing. Nor is this surprising: it combines excellent chemical stability with effective thermal properties and exceptionally reliable dielectric characteristics. This material is totally resistant to the effect of aggressive media, including nitric acid, aqua regia, alkalis and oxidizing agents. Parts made of this material can operate in a temperature range extending from -195 to +250°C.

Transparent plastics are employed for aircraft windows -- plexiglass and triplex. Triplex is a composite safety glass consisting of two layers of silicate glass sandwiching a layer of polyvinylbutyral. High impact loads produce a local breakdown site, while plexiglass shatters entirely. Some triplex glasses are provided with electric heating against icing. Supersonic aircraft speeds made it necessary to increase the heat resistance of plexiglass. Plexiglass grades T2-55 and E2 are designed for pressurized aircraft operating at high temperatures.

Polyamides and polyurethanes, which are quite similar in properties, possess high strength, resistance to abrasion, and a low coefficient of friction. Polyamides are used in the manufacture of certain pinions, bushings, and bearings. Aircraft soft glass mounting fasteners and parachutes are made of polycaprolactam and nylon fabrics. Polyurethanes are used in the manufacture of general-purpose adhesives, compounds, and varnishes.

As we can see, plastics are utilized extensively in modern aircraft construction. But this does not mean that all problems have been solved. More extensive employment of these materials is hindered by their deficiencies. The most important of these is poor heat resistance (100-200°C). Therefore plans call fore increasing the manufacture of polyvinylenes, polyphenylines, and polyamides, which retain excellent mechanical properties at temperatures up to 300-400°C. The creation of supermolecular structures, that is, modification of polymers by means of grafting, introduction of synthetic crystal forming agents, the addition of surfactants, and control of heat treatment conditions constituted a major discovery by Soviet scientists in the field of polymer physics.

Reinforced plastics based on polyester and epoxy resins possess poor heat resistance. But their heat resistance can be greatly increased by the addition of antimony oxide and phosphoric anhydride.

Scientists have now synthesized polymers containing copper atoms, with semiconducting and photoconducting properties, as well as semiconductors of polyester chains with titanium, zirconium, and hafnium atoms introduced into the macromolecule. They possess heat resistance up to 1000-1200°C.

The extensive employment of existing and development of new plastics and other nonmetallic materials are helping to design and build improved aircraft at lower cost.

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ROMANIAN SPACE PROGRAM ACTIVITIES REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 41-42

[Article, published under the heading "Astronautics in the Socialist Countries," by V. Lyndin: "Our Romanian Friends"]

[Text] The Socialist Republic of Romania, just like the other socialist countries, began its activities in the area of investigation and utilization of space for peaceful purposes with observations of satellites with the aid of ground equipment and scientific research in terrestrial laboratories. A space research commission was established in 1968. Commission members included representatives of interested ministries and experts from scientific research institutes and higher educational institutions.

In 1972 the Government of the SRR signed the agreement calling for establishment of the Intersputnik international space communications organization, and in 1976 the intergovernmental agreement on cooperation in research and utilization of space for peaceful purposes, and two years later -- a multilateral agreement on cooperation in the area of remote sensing of the Earth with the aid of aerospace hardware. Today Romania is taking part in all areas of the Interkosmos Program, to the extent of its economic capabilities and scientific-technological potential.

Joint efforts in investigating the upper layers of atmosphere as specified by the Interkosmos Program commenced in Romania in 1972 with the development of mass spectrometer equipment. The first flight tests of this instrument, designated the DESM-1 and designed for this purpose, were performed on the Interkosmos-12 satellite, launched on 31 October 1974. They indicated the need to improve this instrument. The new, lighter and faster-response DESM-3 was placed on board Interkosmos-18. Tests were successful.

Romanian quadripole mass spectrometers were carried on board the Soviet Vertikal'-7 and Vertikal'-10 geophysical rockets, launched respectively on 3 November 1978 and 21 December 1981.

Utilizing a commercially-built Soviet triaxial transducer with ferroprobe, experts at Romania's Institute of Nuclear Physics built the SGR-1 magnetometer, which was carried on board the Interkosmos-18 satellite. The Interkosmos-20

satellite was launched into orbit on 1 November 1979. It carried a new SGR-2 instrument, which was almost a full order of magnitude more accurate than its predecessor. Both instruments were operating in space at the same time as the other for a certain period of time, which made it possible for the first time to perform a simultaneous measurement of the Earth's magnetic field from two satellites. The next model of the magnetometer, the SGR-3, which was even more accurate, was carried by the Interkosmos-21 satellite, launched on 6 February 1981.

The first cosmic ray experiment in which Romanian scientists directly participated was performed by the Interkosmos-6 satellite, launched into orbit on 7 April 1972. The purpose of this experiment was to investigate the chemical composition and energy spectrum of cosmic rays and the peculiarities of interaction between high-energy primary cosmic radiation particles and atomic nuclei. A large photoemulsion unit with ionization calorimeter, weighing a total of 1,070 kg, comprised the bulk of the scientific equipment placed in the earth-returnable capsule. Experts from Hungary, Mongolia, Poland, Romania, the Soviet Union, and Czechoslovakia took part in designing and building it.

The Interkosmos-17 satellite, readied for its mission by scientists from Hungary, Romania, the USSR, and Czechoslovakia, was launched on 24 September 1977. The scientific equipment on board, including the Romanian-built SEZ-10 instrument, was to continue investigations of the effect of solar and galactic emissions on the Earth's magnetosphere and radiation belts, investigations which had begun with the third, fifth, and 13th satellites of the Interkosmos series.

Romanian scientists are also studying cosmic radiation from a biological standpoint. They took part in experiments conducted by the Kosmos-690, Kosmos-782, Kosmos-936, and Kosmos-1129 specialized biological satellites, designed and built detectors for the Doza experiment carried by the Salyut-6 manned orbiting station.

Romanian experts conducted observations of satellites launched as part of the international Bol'shaya Khorda [Great Chord], Dinamika [Dynamics], and Atmosfera [Atmosphere] programs.

The Institute of Meteorology and Hydrology in Bucharest began receiving information from weather satellites in 1971. Romanian experts are also taking part in space communications research projects. These projects include development of a system of direct TV broadcasting via satellite, using space hardware for oceanic radio navigation, and future development of a national multifunction satellite. Since 1974 they have been taking active part in working on scientific-methods problems of Earth remote sensing for various sectors of the economy. Space and aerial imagery in the optical and infrared bands have resulted in pinpointing new, promising areas for mineral prospecting, especially nonferrous metals, and have made it possible to add to and refine maps used in geological exploration.

Since 1967 Romanian scientists have been taking part in investigating adaptation of the organism to conditions of space flight. Experiments began with

simulation in terrestrial laboratories, and were later continued in space. Romanian scientists, together with colleagues from the USSR, other socialist countries, as well as the United States and France, investigated the effect of factors of space flight on animals carried in orbit by the Kosmos-936 and Kosmos-1129 biological satellites.

At the initiative of the USSR, an agreement was signed in Moscow in 1976, calling for manned missions by international crews, with the participation of cosmonauts from socialist countries on board Soviet spacecraft and orbiting stations. The first international crew, which contained a Czechoslovak national, went up 2 years later. This mission as followed by missions which included cosmonauts from Poland, the GDR, Bulgaria, Hungary, Vietnam, Cuba, Mongolia, and Romania.

Romanian cosmonaut Dumitru Prunariu and his backup, Dumitru Dediu, were present at the launch center when the Soviet-Mongolian crew went up.

"This was an impressive sight!" D. Prunariu later recalled. "I felt proud that man had built such powerful hardware, which is capable of lifting human beings into orbit."

Less than 2 months later, on 14 May 1981, he himself was launched into orbit as a cosmonaut-investigator.

Succession in the scientific research program became a characteristic feature of missions by international crews. Experiments begun on one mission would be continued on others. Not only research methods improved but additional scientific equipment was developed as well.

The commander of the Soyuz-40 mission, Leonid Popov, and cosmonaut-investigator Dumitru Prunariu, in addition to conducting new experiments prepared specifically for the Soviet-Romanian mission, continued the work of their predecessors. Investigating the activities of a cosmonaut as equipment operator in conditions of an orbital mission, they utilized the Bulgarian-built Sredets instrument. In the Work Efficiency experiment, the name of which speaks for itself, studies were conducted with the aid of the Hungarian-built Balaton instrument. Another Hungarian instrument -- Pille -- was used to measure radiation levels inside the orbiting station. Similar measurements had been taken previously, but this time they were supplemented with readings by a Romanian-built Mini-Dose instrument. Although irradiation doses are small at an altitude of 350 kilometers, they are of considerable interest to science. Scientists are particularly interested in areas above magnetic anomalies, where the Earth's radiation belts deflect downward, reaching the orbital altitude of the Salyut-6 station.

L. Popov and D. Prunariu continued the cosmic ray studies begun by the Soviet-Mongolian crew. The Romanian scientists were no novices in work of this kind. They first took part in such an experiment, together with their colleagues from the USSR and the other socialist countries, on the Interkosmos-6 satellite. At that time cosmic rays were recorded with special photographic plates, which were returned to Earth. The tracks on the plates were used to determine particle energy, mass, charge, and velocity.

In place of photographic plates and the natural mica used on the Soviet-Mongolian mission, the Romanian specialists employed a new sensitive material -- cellulose nitrate. They built two instruments: the Astro-1 and Astro-2. The first was placed in the station's airlock chamber and was subjected to the effect of open space, while the latter operated inside the space station. This experiment also had a direct practical significance -- comparing the instrument readings, scientists could estimate the protective effect of the station hull.

An experiment entitled Nanovesy [Nanobalance] was conducted in the airlock. The experiment pursued two aims: study of evaporation in the vacuum of space of a silicon dioxide film, which can be used to protect panels of solar batteries, and testing of the instrument itself in one of the possible areas of its utilization.

An industrial-process experiment called Kapillyar [Capillary] was conducted in Soviet Splav [Alloy] and Kristall [Crystal] electric heating units. The purpose of the experiment was to develop a process of obtaining in space single crystals of a desired shape with the aid of capillary forces.

The Soviet-Romanian orbital mission included more than 20 different experiments. Without the assistance of the crew already on board the orbiting station, it would have been simply impossible for Leonid Popov and Dumitru Prunariu to accomplish such a large volume of work. Vladimir Kovalenok and Viktor Savinykh, as hospitable hosts, assumed the main burden of housekeeping chores in their orbital home. They helped the Soviet-Romanian crew prepare equipment, conduct scientific research, with radio communications and TV sessions. This also has become a fine tradition in teamwork and cooperation between resident and visiting cosmonauts in orbit.

Space is frequently compared with a road which has no end. The Interkosmos program international manned missions opened up a new stage in the investigation and exploration of space. And each new step along this road makes a contribution to the storehouse of knowledge and experience of all mankind.

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SPACECRAFT REENTRY AND LANDING CALCULATIONS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 43-44

[Article, published under the heading "Space Flight Support," by Doctor of Technical Sciences Prof A. Brykov, Honored Scientist and Technologist RSFSR, Lenin Prize recipient: "Descent to Earth"]

[Text] Theoretically a spacecraft can descend to a desired touchdown point from any point in orbit; the only thing required is a suitable application of power. Indeed, transitioning a spacecraft from orbit into a descent trajectory signifies in the general case, from the standpoint of mathematics, a reduction in the vehicle's orbital velocity and turn to a desired heading, as is indicated in Figure 1. In a simplified version, with the orbital track passing over the landing point, it suffices to reduce orbital velocity with a deceleration burn. We should note that the closer the point of deceleration burn initiation to the landing area, the greater the force of the deceleration burn must be.

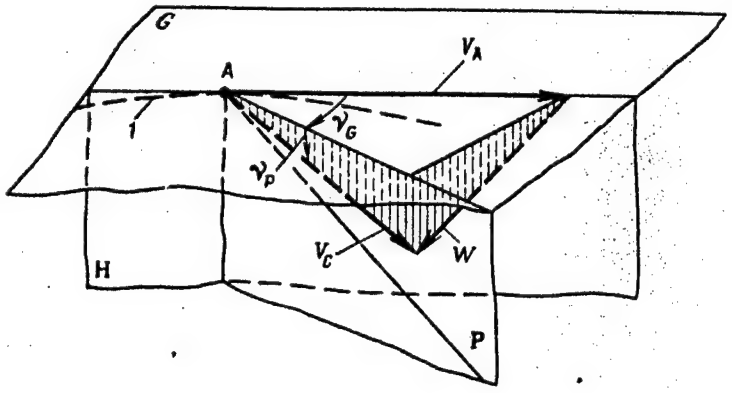

Figure 1. Vectored Thrust Application to Spacecraft During Descent: H -- orbital plane; P -- plane of descent trajectory; G -- plane passing through V_A and perpendicular to H.

In fact, if deceleration commences over the point of landing (minimum distance), orbital velocity must decrease to zero, $W=V_A$. On the other hand, if spacecraft transition into descent trajectory commences at a considerable distance from the point of landing, the required burn is less. Consequently, in a deceleration burn trajectories with the greatest descent distance prove to be advantageous from an energy expenditure standpoint. Accuracy of landing, however, suffers with an excessive increase in descent distance. This is caused primarily by two elements: a longer period of effect by disturbing factors, and small angles of entry into the atmosphere. As we know, such trajectories are characterized by a high degree of dispersion.

Thus with a spacecraft descent, in addition to the smallest possible deceleration burn, it is also necessary to ensure maximum accuracy of landing. It is necessary to compromise. With given orbital parameters and characteristics of the descending spacecraft, a quite specific descent distance corresponds to each specific landing accuracy requirement. Consequently, matching landing accuracy requirements with the spacecraft's deceleration burn capabilities, one can determine the required burn.

Different variations are possible. For example, descent into a given area can be accomplished in two moves: first turning the orbital plane in such a manner that the spacecraft's track crosses the desired point of landing, followed by a second burn to put it into a descent trajectory which provides the requisite accuracy. We should note that the earlier the first maneuver is accomplished, the smaller will be transverse component W_B, and consequently the smaller will be the total burn.

Even with a specified descent distance, however, there exist a great many trajectories which will put the landing into the desired point (Figure 2). These trajectories differ not only in initial descent velocity V_c but also angle γ_p. When $\varphi=0$ transversal deceleration occurs. The deceleration burn decreases with an increase in φ. There exists an optimal angle $\varphi_{опт}$, to which a minimum deceleration burn value corresponds.

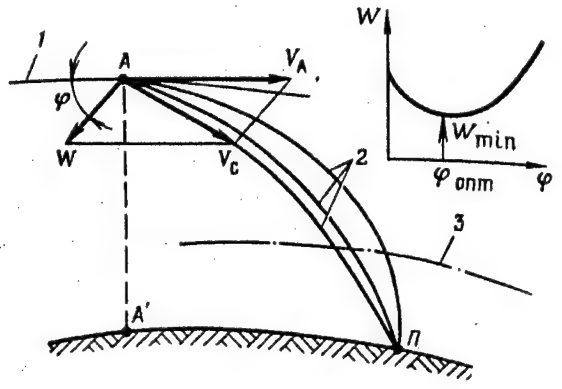

Figure 2. Nature of Relation $W(\varphi)$.

Thus a descent trajectory which incorporates the required landing accuracy with a minimum expenditure of energy has been found. But satisfying optimal ballistic requirements does not yet mean an end to our search for a solution.

During deceleration in the atmosphere by a descending spacecraft, its energy of motion is virtually entirely converted into heat, part of which scatters in the ambient medium, while the remainder heats the vehicle's skin. Change in acceleration of motion causes G-loads. Thus there arises the problem of protecting a descending spacecraft against excessive heating and high G-loads. Provision of effective shielding entails a more powerful booster and heavier spacecraft. Therefore in computing descent preference is given to those trajectories which satisfy G-load and heat flow requirements.

Practical experience has shown that heat flows decrease with a decrease in angle of entry into the atmosphere. There exists an optimal angle of entry which ensures allowable heat conditions for the descending spacecraft. The optimal angle of entry is determined by the parameters of entry into the atmosphere, spacecraft design and aerodynamic characteristics. Thus the actual conditions of descent make it impossible unequivocally to select a trajectory which equally satisfies requirements pertaining to accuracy of landing and energy expenditure, heat conditions and G-loads. This is also hindered by difficulties in taking into account various errors. An orbit differing from the actual orbit is utilized, for example, in computing descent parameters. Commands transmitted to the spacecraft incorporate errors. The values of a number of design parameters of a descending spacecraft, the aerodynamic characteristics and astrophysical constants adopted for calculations also differ from the actual ones. Therefore the actual descent trajectory is different that the computed trajectory.

In order to ensure the requisite reliability of descent it is essential on the one hand to select descending spacecraft parameters so as to ensure that throughout the entire range of possible trajectories the thermal and force loads do not exceed the maximum allowable, while on the other hand it is essential to organize control in such a manner that actual descent trajectories do not go beyond specified limits.

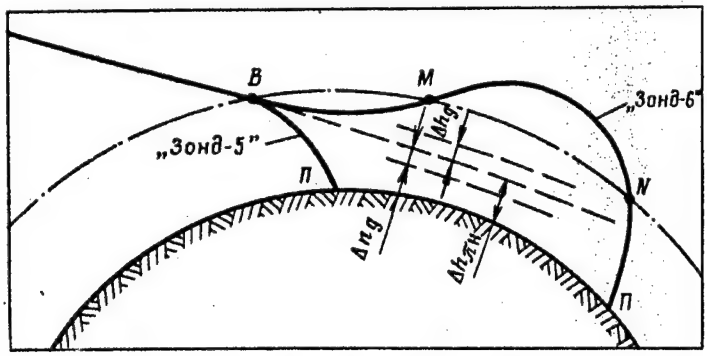

Figure 3. Descent and Landing Diagram for the Zond-5 and Zond-6 Probes.

The lunar missions are a vivid example of the most rigid limitations on selecting descent trajectories. Figure 3 contains a diagram of the ballistic descent of the Soviet Zond-5 unmanned lunar probe. Restrictions on conditions of atmosphere entry here were determined by hypothetical perigee altitude h_{π}. If for the actual orbit it proves to be less than nominal $h_{\pi_н}$ by an amount exceeding allowable Δh_g, that is $h_{\pi} < h_{\pi_н} - \Delta h_g$, the angle of entry into the atmosphere will exceed the maximum allowable, and the spacecraft will be subjected to an excessive G-load with intolerable specific heat flow values. With a hypothetical perigee value of $h_{\pi} > h_{\pi_н} + \Delta h_g$, the descending spacecraft will land outside the target area. Δh_g=5 km for Zond-5. The exceptionally high sensitivity of parameters of motion to change in conditional perigee altitude is due to the high velocity of the probe (escape velocity) and the vehicle's small values of angle of entry into the atmosphere.

A similar situation developed during the controlled descent of the Zond-6 unmanned lunar probe. The vehicle entered the atmosphere at point B and "skipped" back out of the atmosphere, emerging at point M. Following a passive trajectory (segment MN), the vehicle again entered the atmosphere, and the control system guaranteed a vehicle landing at point П. We shall note that selection of such a complex descent configuration for the Zond-6 probe was dictated on the one hand by the desire to bring it down within the Soviet Union with a minimum G-load and acceptable heating conditions, and on the other hand by the impossibility of utilizing shorter trajectories, since the distance between the point of entry into the atmosphere and the location of the landing area is unambiguously determined by the lunar orbital parameters and geographic location of the Soviet Union. Of course a landing in a simpler configuration is also possible. Then, however, the conditions of descent would prove to be very difficult. For example, during the return to Earth of the reentry vehicle of the unmanned Luna-16 station, a ballistic descent was made, with a high angle of entry into the atmosphere. As a result, the vehicle was subjected to 350 Gs, and the vehicle surface temperature exceeded 10,000°C.

The final phase of a Soyuz mission serves as a classic example of satellite descent from orbit. Several revolutions before transitioning into descent trajectory, a turning of the orbital plane is accomplished in order to run the "landing" revolution over the recovery area. In addition to reducing energy expenditures, this also makes it possible to radar monitor the orbital path in order to determine it more precisely just prior to reentry. The point at which the deceleration burn commences and thrust direction W (Figure 2) are selected proceeding from the condition of ensuring a landing onto a specified line of sight (for example, a specified longitude, when the descent path in the recovery area is perpendicular to the meridian). The optimal direction of thrust with a specified modulus value is determined according to the criterion of minimizing dispersion.

The presence of cosmonauts on board a spacecraft imposes additional restrictions on the operation of transitioning into a descent trajectory. For example, in order that the cosmonauts can visually verify the correctness of the spacecraft's orientation during the deceleration burn, the craft should be positioned above the day side of the Earth. In order to provide the capability of manually-controlled descent, the boundary of illumination should be extended, so that preparations for this operation and its execution are performed above

the day side of the Earth. In order to facilitate search and recovery of the cosmonauts, the craft should touch down not later than 1 hour before sunset.

The large number of restrictions and the highly critical nature of the descent operation (impossibility of repetition in case of failure) impose extremely rigid conditions on the process of ballistic support of spacecraft control, for in order to descend from orbit it is necessary to take navigational measurements in the preceding phases of the mission and from these measurements determine the actual orbit, the moment to initiate the deceleration burn, duration of burn, and direction of thrust; it is necessary to generate command information for orienting the spacecraft, turning the deceleration burn motor (if necessary), execute a maneuver and transmit this information to the spacecraft, and predict the spacecraft's motion.

Obviously a descent can be accomplished in a sure and reliable manner only when the operations enumerated above are performed exactly at the time specified and with the specified degree of accuracy. Methods and programs are developed for this purpose, which enable the space mission support services to accomplish their assigned tasks pertaining to spacecraft descent and landing, cosmonaut search and recovery.

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ISRAELI AIR TACTICS IN LEBANON ANALYZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 10, Oct 83 (signed to press 31 Aug 83) pp 46-47

[Article, published under the heading "Abroad," by Col V. Dubrov: "Aviation in the Lebanese Conflict" (second of two parts: first part appeared in No 9, 1983)*]

[Text] Mass production of and trade in weapons is a source of the fabulous profits of the bosses of the U.S. military-industrial complex. In the chase after superprofits, the proprietors of companies which have filled their pockets from the manufacture of various death-dealing wares on Pentagon contracts are developing more and more new weapon systems. A prominent place in this vast quantity of arms and equipment is occupied by the latest aircraft systems and ECM gear, which have been tested in the skies over Lebanon.

As is reported in the foreign press, light F-16 aircraft, which did not carry medium-range weapons, were utilized most intensively in combat in the skies over Lebanon in 1982. Attacks from forward of the nine-three line without transition to a maneuver phase were sporadic occurrences, an indication of the future, but did not represent standard fighter tactics. Also confirmed was the conclusion reached from simulation that with increasing penetration deep over hostile territory there occurs deterioration of radar monitoring of fighter aircraft, with increased probability of attack without warning by defending forces, and conditions for maneuver combat arise. Air superiority, however, is gained primarily by fighting over hostile, not friendly territory (the latter signifies loss of initiative in the battle for air superiority).

The warning system contained in all fighters informed the pilot when his aircraft was locked on by hostile radar, and subsequently informed him when missiles were launched. The pilot would immediately execute an abrupt maneuver and would simultaneously release decoys which, after separation from the aircraft, would give off greater thermal radiation than the aircraft itself. The IR seeker would retarget, and the missile would continue in a false direction. The fighter's warning system was capable of transmitting a signal to release decoy flares from a container inside the fuselage, and automatically, without any action by the pilot.

* Based on materials in foreign publications.

Elements of electronic warfare have more and more deeply penetrated air combat. In addition to intensive radio and radar jamming, which according to the plan of operation would be conducted from an airborne Boeing 707 and from ground stations deployed on Lebanese soil, electronic warfare gear carried by combat aircraft would also be employed. F-15 and F-16 fighters (on the latter in a removable modular package) carried active jammers coupled to an incoming signal analyzer. This system operated against the greatest threats, measured the frequency of the received signal, selected a type of confusing jamming technique, and utilized directional data on the source of emissions to concentrate radiated jamming power.

Thus the airborne jammer would switch on automatically in response to a threat and would beam confusing emissions straight at the adversary. Controlling output power made it possible to increase by many orders of magnitude the effectiveness of ECM in comparison with the older transmitters. Chaff (passive jamming) was also employed in addition to active jamming to thwart radar-guided missiles. On F-15 and F-16 aircraft they were placed in special cartridges in the same inside-fuselage containers as the flares (IR decoys). When an aircraft would be painted by missile guidance radar, they would be released, forming a dense cloud, which reflected back the emitted "illumination" signal. According to the journal MSN, the possibility of causing the missile to head for the chaff cloud depended on a combination of the following factors: comparability of effective reflecting surface of decoy and actual target, exceeding the radar's resolving power in linear and angular coordinates, promptness and correctness of maneuver to extract the aircraft from the coverage zone of the radar tracking it. For greater effectiveness, chaff should be deployed immediately and should form, together with the protected aircraft, a single unresolvable tracking radar return.

Changes also took place in modes of conduct of air reconnaissance. The Israeli command intensively utilized unmanned reconnaissance drones. A trend toward replacing manned reconnaissance aircraft was noted as early as the air war in Southeast Asia, in which drones flew a total of more than 3,000 sorties. The adoption of reconnaissance drones is due in the first place to the fact that they are cheaper. According to figures published in the U.S. press, a modern military reconnaissance aircraft costs an average of 10 million dollars, while a reconnaissance drone costs 1 million dollars. The gain is obvious when evaluating combat capabilities according to the criterion of cost-effectiveness. Another factor is the savings in cost of training and maintaining a pilot, as well as replacing combat losses.

The BQM-34, built by Teledyne-Ryan, was the most extensively utilized reconnaissance drone in Vietnam. Having studied the results of their combat employment, the Israeli military command authorities purchased 12 of these drones and used them in the 1973 October War. In contrast to the U.S. drones, which were for the most part launched from a mother ship (DC-130), the Israeli reconnaissance drones are launched from a ground catapult. After the October War manned reconnaissance aircraft and drones continued regularly flying missions over the territory of Arab countries. The number of these aircraft increased in the Israeli Air Force.

BQM-34 reconnaissance drones flew for the most part high-altitude photoreconnaissance missions, carrying cameras with a focal length of 76 mm.

The small reflecting surface of reconnaissance drones allegedly makes radar detection difficult, while their small size (particularly when observed from the rear) and ability to maneuver with a bank angle up to 30° and at 5 G make interception -- fighter visual contact and attack -- difficult.

Experts consider the following to be deficiencies of the BQM-34: a flight is executed according to a program fed into the aircraft's computer on the ground, and the program cannot be modified during a mission. Therefore Israeli built Scout and Mastiff remote-controlled drones were employed for battlefield reconnaissance. A modified version of the Mastiff, the MK-2, is a light, small reconnaissance drone powered by a two-cylinder piston engine (14 horsepower, fuel capacity 22 liters). Airborne equipment includes a TV reconnaissance camera, an aerial camera, a forward-looking IR, receiver, and a laser rangefinder-target designator. Various equipment packages are interchangeable. The principal version -- a TV camera -- scans the ground surface with 360 degree horizontal capability and 90 degree elevating range.

The Mastiff would be launched from a truck-mounted compressed-air catapult. The drone would be remote controlled from a modular ground station on a truck chassis. Commands to the drone would be transmitted via a tracking radar antenna, with data from the drone picked up by a receiving antenna. The ground operator would monitor the programmed flight and, if necessary, would make corrections to the program. A navigator would mark the actual flight track on a 1:12,500 scale map. An observer-controller would manipulate the airborne TV gear. The transmitted TV picture would be displayed on a 35 cm TV screen and be recorded by video tape recorder, with digital information added, on time and conditions of conduct of reconnaissance.

According to reports published in the magazine AVIATION WEEK, the battlefield reconnaissance system, which included 4-6 drones, mobile control stations (requiring a crew of seven) and launcher, in addition to its basic functions, guided ground-attack aircraft to spotted targets and evaluated strike results. When a reconnaissance drone carried a laser rangefinder, which illuminates the target with a laser beam, it would provide target designation for strike aircraft firing laser-guided weapons. The comparatively low cost of the system (500,000 dollars, that is, comparable to the cost of a BQM-34 drone) made it possible to utilize Scout and Mastiff drones rather extensively as decoy targets. Foreign experts consider that one of the advantages of this battlefield reconnaissance system, which was utilized for the first time in actual combat conditions, was acquisition of accurate real-time information on ground targets, which is extremely important for employing air strike forces.

Foreign observers note the following specific features in the modes of action of Israeli air strike forces: penetration of hostile air defense at other than extremely low level, and increased scale of employment of air-to-surface guided weapons.

The first item is due to the specific features of conduct of air combat operations. Air combat was taking place in the skies above a country lacking a

modern air defense system. Resistance to the aggressor was being offered by antiaircraft subunits which were a part of the inter-Arab forces (deployed on Lebanese soil by agreement). The clustered deployment of air defense weapons made it possible to avoid entering their effective kill zones, especially under the screen of high mountain ridges. Therefore there was no need to drop to extremely low level. We shall recall that this mode was the principal one employed in the 1973 October War, when Israeli aircraft invaded Syrian and Egyptian airspace.

Flying at higher altitudes made it possible to eliminate formations which were extended in depth (for the most part columns of aircraft pairs) and to employ close formations, which ensured a higher strike density. A flight would open up only when running at the target from different directions for attack by pairs of aircraft (individual aircraft). A "star" type attack was for the purpose of dispersing the fire of the battlefield air defense weapons protecting the strike objective. Altitude of dive initiation (shallow) ran 2,500-3,000 m, and disengagement -- 1,500 m. A strike would be delivered without preliminary maneuvering and without repeat target passes. These tactics were in conformity with the configuration, established in local wars, of strikes with delivery of conventional (unguided) ordnance, when poor accuracy on the target was compensated for by the large number of free-fall bombs dropped on the target.

Modes of employing guided weapons differed appreciably from conventional pattern bombing. Their greater accuracy, due to guidance to the target, made it possible not to bring the strike aircraft together into squadron groups. The principle of "each to his own target" was observed. There was no large-scale employment of guided weapons on a single mission (just as in the U.S. aerial aggression against Vietnam), since these weapons are quite costly (in comparison with conventional bombs and rockets), and supplies were limited. Therefore guided bombs and missiles were employed only against selected important targets.

Adjustments were made in modes of combating air defense, taking into account the capabilities of Scout and Mastiff remote-controlled drones as well as air-to-surface guided weapons. The method of "blinding-suppression", traditional with the Israeli Air Force, was divided into phases (using the terminology of Western observers).

The first phase included launching of decoy targets -- cheap unmanned aircraft -- and their periodic incursion into the effective killing zone of antiaircraft weapon systems. This phase lasted several hours and pursued the aim of keeping in a state of tension and physically exhausting the enemy's ground air defense weapon crews. The second phase -- blinding -- includes passive and active jamming of hostile radars and creating conditions for aircraft to penetrate to strike targets undetected. The third phase includes penetration to the targets by aircraft armed with guided weapons, and employment of guided bombs and missiles against vitally important air defense facilities. The fourth phase -- suppression -- includes multiple-aircraft fighter-bomber strikes, carpeting area targets with standard ordnance (most frequently employed were cluster bombs containing 500 gram submunitions, bursting of which would cover an area 25 times the lethal burst radius of a 240 kilogram high-explosive bomb).

As foreign observers emphasize, division of an entire strike stage into phases is highly arbitrary, since there are no clear-cut boundary lines in time, points, and attack targets, as well as in sequence and modes of strike delivery. For example, an important role in combating air defense at this time was played by ground launchers firing large-caliber unguided missiles, called Wolf in the foreign press. This surface-to-surface missile, into the control system of which the target coordinates would be entered in advance, would be fired from a range of about 40 kilometers, and would cause the greatest destruction. The "nonstandard" distance between air defense facilities and the "battle line" in Lebanon permitted employment of this strike delivery mode, which would be unusual for other conditions.

Experts do not specify new elements in the content proper of the phases, other than employment of drones as decoy targets and means of guidance (target designation) for strike aircraft armed with guided bombs and missiles. It is particularly emphasized that all guided weapons -- Shrike, Standard ARM, Walleye, Maverick, and glide bombs -- were supplied to Israel by the United States and had already been tested in the concluding phase of the air war in Vietnam. Foreign experts have doubts about the thesis pertaining to their release in the Lebanese conflict beyond the "range of air defense weapons," since the launch (release) range which ensures the desired target accuracy, according to the experience in Vietnam, did not exceed 13-16 km, a figure which applies first and foremost to the Shrike and ARM antiradiation missiles, which employ a passive system of guidance to the emission source.

One of the main advantages of guided weapons is considered to be high accuracy, which determines the possibility of reducing the size of the force employed to hit a standard target. Economy (cost reduction while retaining effectiveness), however, is achieved only with fairly complex organization of combat support. The crew of an aircraft armed with guided bombs presently requires preliminary suppression of medium-range air defense weapons in the strike area and accurate real-time data on target location. It is considered inadvisable for an aircraft carrying costly ordnance to perform indepedent search in a zone in which air defense has not been suppressed or neutralized. The loss of such an aircraft is much more costly than the damage inflicted on any tactical target is costly to the adversary. Therefore search (reconnaissance) would be conducted by auxiliary, less expensive means.

There is one more feature to which foreign experts recommend that attention be focused when analyzing contemporary combat experience: local wars are often called "proving grounds" for testing new aircraft and weapons. Suffice it to cite the examples of "testing the combat performance" of the F-111 and A-7D aircraft which had become operational with the U.S. Air Force, and "evaluation of the capabilities" of laser, TV and infrared guided bombs as well as ECM devices in Vietnam. To this list one can also add initiation to combat of the new F-15 and F-16 fighters by the Israeli Air Force in the Near East. In order to create optimal conditions for operational testing, the situation may sometimes be artificially simplified or, on the contrary, be made more complicated, as was the case in last year's armed conflict in Lebanon. For this reason foreign observers recommend that one approach the experience of local wars in a critical manner, which means first and foremost caution and careful verification when applying it to other conditions.

In the final analysis, however, and this must be stressed, the merchants of death in Washington and their Tel Aviv stooges are not at all concerned by the fact that it is primarily thousands of innocent civilians who are being killed by weapons manufactured at military plants in the United States and Israel. The Israeli militarists, blinded by Zionist propaganda and egged on by the Pentagon, are testing the latest weapons, including air weapons, in actual combat. But nothing can break the will of the Lebanese people, who aspire to freedom and independence. With the support of peace-loving, progressive forces, the resistance of the Lebanese people to the Zionist butchers is growing day by day.

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